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MR. SAMUEL LOCKE, M.R.C.V.S.

No man has more earnest desire for the welfare of his profession than the newly elected President of the Royal College of Veterinary Surgeons, and the honour just conferred upon him is well deserved. Ever since his graduation in 1869 he has been a thorough worker in the van of progress, and during the past twenty years very few of the arrangements which have tended to put the profession on a higher plane have been made without his knowledge or assistance. For many years Mr. Locke has been a prominent official of the Lancashire Veterinary Medical Association, having served in office as President and Secretary, and the Benevolent and Mutual Defence Society has also claimed his attention as Secretary since 1891. Elected a member of the Council of the Royal College of Veterinary Surgeons in 1895, he was made a Vice-President in 1900, 1904, 1906, and 1908.

Although occupied in a very large and busy practice, and with official appointments, including several influential Veterinary Inspectorships under the Board of Agriculture and the Local Authority, Mr. Locke has managed to snatch sufficient time to become a very prominent member of the Manchester City Council, and in this position has rendered sterling service to the support of any movement where the appointment of a veterinary official was likely to be of public benefit. The Manchester system of food inspection is one of the most complete in Great Britain, and is the nearest approach we have in this country to that of Germany and other Continental countries, with which it can be favourably compared. It was undoubtedly largely due to his exertions that properly qualified veterinary officials were appointed in control of the abattoirs and meat inspection instead of butchers as formerly.

His popularity as a member of the City Council received ample proof a short time ago, when he was wishing to retire on account of his increasing practice, as both political parties were unanimous in a request that he would reconsider his decision and allow himself to be re-nominated.

The profession may feel quite safe in having Mr. Locke at the helm, for his business capabilities and tact have been proved over and over again, and our present President is in every way a good organizer and financier. We fear no contradiction in asserting that Mr. Locke has the full confidence of the members of his profession, and we have every assurance that his will be a very successful year of office.

Editorials.

MALLEIN AND TUBERCULIN.

In this issue we reproduce an excellent paper on the above subjects by Mr. Sidney Villar, whose great experience of the use of mallein and tuberculin permit him to speak with authority. In his opening remarks, Mr. Villar expresses regret that there is no legal standard of strength for either of these most useful diagnostic agents. We agree with him, for it is an undeniable fact that various makes of these agents do not give uniform results, while the dose, according to some makers, is double that recommended by other makers. Another point, however, appeals to us as a matter for greater regret, and that is the absolute lack of control over the sale of agents which have been shown to lend themselves to such fraudulent uses. It has been asserted, and with some foundation of truth, that horse-owners and cow-keepers whose animals are likely to be tested for glanders or tuberculosis can obtain unrestricted supplies of mallein or tuberculin, and to some extent immunize their animals, so that they may defeat the subsequent attempted test. It has been reported that bulls sold for export subject to their passing the tuberculin test, and shipped after being certified free from tuberculosis, have been rejected on arrival at the foreign port as the result of a positive reaction to tuberculin. Of course it is possible that in such cases there was no fraudulent action, and the bulls may have been tested before shipment while in the incubation stage of the disease. In any case, however, it would be far better, especially as it is now proposed to legislate for the control of tuberculosis in cattle, if the sale of tuberculin could be controlled and limited to responsible persons. We understand that at the present moment legislation is being undertaken with this end in view in New York State.

Mr. Villar has laid great stress on the necessity for taking the temperatures at least four times after the injection of tuberculin. We submit that for safety the temperature should be taken five times, viz., at the ninth, twelfth, fifteenth, eighteenth, and

twenty-first hours after injection. We do not quite agree with Mr. Villar when he says that "a temperature which, though risen, has dropped by the twelfth hour would not be a positive or even a suspicious reaction." We submit that in some cases an early reaction may occur, just in the same way as Mr. Villar has shown that a late reaction may be met with, and, if we altered our suggested times of recording the temperature after injection, it would be to include that at the sixth hour. One can scarcely imagine that some veterinary surgeons are content to rely on one taking, viz., at the twelfth hour; yet such is the case, and it is little to be wondered at that as a result the accuracy of the test is sometimes disputed. Within the last few days we have had our attention drawn to a certificate of the tuberculin test conducted by a veterinary surgeon on a pedigree shorthorn bull, in which two temperatures were recorded after injection, but there was no indication whatever as to when those temperatures were taken; it may have been the next day or even the next week. Such certificates are absolutely not worth the paper they are written on, and we would urge veterinary surgeons not to get into such a slipshod habit, since the effect will be to bring even greater discredit on tuberculin, or on the person conducting the test.

With regard to the use of mallein, very few errors would be made if proper care were taken in the interpretation of reactions as summed up by Mr. Villar in the following words: "When glanders is present in a horse, the injection of mallein is usually followed by a well-marked thermic and local reaction, accompanied by some systemic disturbance; but when such positive diagnostic indications are not all present a local persistent reaction of a painful nature is in itself diagnostic of glanders. A well-marked rise of temperature unaccompanied by a precise local reaction is not conclusive, but if accompanied by systemic reaction is, in a member of an infected stud, of the gravest suspicion, and would warrant us in advising the slaughter of the animal."

MELBOURNE UNIVERSITY VETERINARY SCHOOL.

THE decision to establish a veterinary school in the University of Melbourne was noted in this Journal some time ago, and we are glad to say it has now become an established fact. In a continent like Australia, where the material prosperity is so bound up with agriculture, it is significant of marked progress, especially when considered in conjunction with the institution a year or two ago of a School of Agriculture by the same University. The success accompanying the raising of stock will undoubtedly depend on the health of the stock; hence the necessity of providing the community with an adequate supply of properly trained men to investigate and advise in the event of the almost inevitable outbreaks of various diseases. Another prime necessity is the provision of well-trained meat inspectors, for the meat export trade is rapidly growing, and its continued growth will largely depend on the confidence of Europeans that they are getting good and wholesome meat free from any suspicion of diseased conditions. No step will be so calculated to produce that confidence as the establishment of a complete system of meat inspection by reliably trained veterinary experts, whose duties should include examination, both during life and after slaughter.

We have not yet heard any details as to the length of the college course before the granting of degrees or diplomas, but we trust that it will be adequate. In the British Isles it has been found that a proper training cannot be given under four years, and we hope that Australia will profit by that experience, and not begin by giving a short course which can only result in the turning out of men less well equipped for the work they will have to perform.

We congratulate Melbourne University on her choice of the first Dean of the Faculty of Veterinary Science. Professor Gilruth has made a name, which is known all over the veterinary world and particularly throughout New Zealand and Australia by dint of his good work amongst animal diseases in the Southern Hemisphere. He will be sorely missed in New Zealand, but New Zealand's loss is Australia's gain. His special fitness for his new post is due, not only to his great ability, but also to his great tact and unbounded enthusiasm. He is bound to make the

new school a success if allowed a free hand, and if he is not hampered by want of means. It is quite possible that eventually the Melbourne University Veterinary School may wish to become affiliated to the Royal College of Veterinary Surgeons, and we cordially hope that such affiliation may be made possible. Of course, before such an event can take place, the new school will be under the obligation to show that its course is equal to that prescribed by the Royal College, that its teaching is up to the same level, and that its examiners and examinations are up to the same standard. That is not asking too much, and when that is done we are of opinion that the Royal College would readily welcome the suggestion of affiliation.

With regard to funds, the mother-country may perhaps take a lesson from her children, though she is very slow to do such things, and she has constantly ignored the excellent example of other European countries in the matter of the provision of funds for veterinary education. The Melbourne College is to receive an annual endowment of £4,000, while the grant allowed to the largest Veterinary College at home, viz., the Royal Veterinary College, London, is the mean and paltry sum of £800 per annum, and that is not a definite endowment.

We have great hopes for this latest veterinary school, and we wish it the greatest possible success in the wide field which is opening out before it.

An order has been issued by the Board of Agriculture and Fisheries revoking the orders prohibiting the landing in Great Britain of hay or straw from the States of Pennsylvania, New Jersey, New York, Maryland, and Delaware.

General Articles.

MALLEIN AND TUBERCULIN.[1]

BY SIDNEY VILLAR, F.R.C.V.S., HARROW.

WHILST fully appreciating the great honour which your President and Committee have done me in inviting me to read this paper, I cannot but regret the quality of the subject chosen. Within the somewhat brief period which has elapsed since this invitation was extended to me it would be impossible to attempt to institute any line of research with the hope of gleaning any original fact either as to mallein or tuberculin to lay before this meeting ; more especially is this so as for nearly two decades—since Koch in 1890 announced his discovery of tuberculin, and the Russian veterinary surgeon, Kelning, in the same year discovered mallein—the most able men in the medical and veterinary professions throughout the world have been working at these subjects, aided by, or at all events, criticized by, agriculturalists and the general public. Both mallein and tuberculin may be described as well-worn subjects, and any paper read under such circumstances must largely take the nature of repetitions of the observations and views of others.

But, if the purview of this paper is a wide one, it possesses the advantage of offering you a large scope for discussion, and I venture to hope that gentlemen present will not only freely criticize any points I may raise, but that they will be good enough to give us their personal experiences of the value of mallein and tuberculin, and so add to the general knowledge of these subjects.

It is, however, impossible to anticipate that anyone can bring forward any facts which will shake our faith in the great value of mallein as a diagnostic agent in glanders—indeed it is as nearly as possible infallible as a test for that disease; and as regards tuberculin, we shall probably all agree with the view expressed by Sir John M'Fadyean, that the tuberculin test for tuberculosis in cattle "is, when properly carried out, one of quite remarkable accuracy." (*Journal of Comparative Pathology and Therapeutics*), vol. xvi., p. 159.)

I propose, firstly, to consider some details which are common to both the subjects of this paper, and then to deal separately with mallein and tuberculin. Both these substances are manufactured in the same way—*Bacillus tuberculosis* and *B. mallei*—the active living bacilli which are the cause of those diseases are cultivated for several weeks in bouillon or broth to which a little glycerine has been added. As a result the broth is crowded with bacilli, which are then all killed by subjecting it to sufficient heat. It is then filtered through porcelain, which removes all dead bacilli and *debris*, and the filtrate consists of a fluid which holds in solution chemical substances the precise composition of which is unknown, but which were produced or generated by the living bacilli in the performance of the functions of their life. This clear filtrate is the fluid we use in testing ; it contains no bacteria, bacilli, or living organisms of any sort. Carbolic acid, ·05 per cent., is added as a preservative, and in this state we use it with the certain

[1] Read before the National Veterinary Association, Harrogate, July, 1909.

knowledge that it will produce no permanent ill-effect in the animal on which it is employed.

It is advisable to use tuberculin and mallein of recent manufacture, but the material now supplied to us in hermetically sealed glass tubes is reliable for a long period, certainly for a year.

It is said to make no difference to the potency of tuberculin whether the bacilli employed in its manufacture are obtained from a human or bovine source; one would quite naturally suppose that a strain of bacillus from the more virulent—the bovine—source should be used. Be that as it may, we know from practical experience of their effects that the tuberculins now on sale in this country differ greatly in their strength, and that it is possible to obtain a tuberculin, made and sold in perfectly good faith, which will cause at least 50 per cent. less reactions than other tuberculins on the market.

It is regrettable that no standard of strength for mallein or tuberculin is legally provided for and insisted upon. In the absence of such legal guarantee we must protect ourselves by purchasing our material for testing only from manufacturers whose mode of procedure is well known to us.

Cattle for a period before and whilst undergoing the test must be kept indoors and protected from draughts, and as far as possible from excitement. Horses may be tested in the open air, provided they are tied up and have some shelter, such as the lee side of a wall or under trees, and are clothed at night and not left unattended.

The injection should be made immediately beneath the skin. The needles of the syringes usually supplied are much too thick and bulky; for many years I have used needles, supplied by Messrs. Arnold, very little thicker than those used in human surgery, without accident of any kind. A big needle is not only needlessly cruel to the animal, but increases our difficulty in puncturing the skin.

The needle and syringe should be boiled before use or rinsed in a 5 per cent. solution of carbolic acid. The skin at the seat of the operation, both in horses and cattle, should be swabbed with a similar solution of carbolic acid or some other disinfectant; not that such a swabbing will render the skin aseptic, but should any ill-effect arise subsequent to the injection we have the satisfaction of knowing we have taken every care in operating, and done all that is practically possible to prevent any untoward effect arising. Personally I have never had any ill-effect either to horses or cattle from testing, but have heard of cases in which anthrax and quarter-ill have developed very shortly after the operation, and which have caused the safety of these tests to be questioned.

Mallein.

In making a subcutaneous injection of mallein for diagnostic purposes in horses suspected of glanders we look for evidences of reaction to the mallein, of which there may be three, viz.: (1) a thermal, (2) a constitutional, and (3) a local reaction.

In the majority of horses affected with glanders all three reactions are to be observed within twenty-four hours of the injection of the mallein, and in such cases there is no difficulty in arriving at a definite and certain opinion that glanders exists. Indeed the process of

diagnosis in such well-defined reactions is delightfully simple, and is absolutely reliable; but there are a number of cases in glandered horses where only one of the three reactions may be definitely exhibited, and there are a still larger number of healthy horses—or at all events horses which are quite free from the bacillus of glanders—where we may get one of these three reactions supervene with some intensity on the injection of a dose of mallein. It is such variations in the effects of mallein injections and the indications to be deduced from them which raise the mallein test to the level of a scientific process—a process the precise value of which can perhaps only be arrived at by much practical experience of testing. But, given that the veterinary operator has this practical experience of the mallein test, with some knowledge of the history of the case under consideration, he is in a position in perhaps ninety-nine out of a hundred cases to say definitely that a horse is or is not affected with glanders. Let us consider these three reactions seperately.

The local reaction consists of a swelling—an œdema of the tissues—round the point of inoculation. It is the reaction to which the most importance is to be attached, and in my personal experience is the only reaction which invariably occurs in cases of glanders.

A typical local reaction commences as an almost circular swelling, standing well up from the surface of the neck around the spot where the needle puncture occurred, and which is often 2 in. to 3 in. in diameter at the sixth hour after injection. It continually increases in size until at the twenty-fourth hour it may be 7 in. or 8 in. long and 4 in. or 5 in. in vertical measurement.

The swelling is persistent, always being evident for three or four days, often increasing in size up to the forty-eighth hour, and amounting in some cases to a very considerable tumefaction of the neck. The edges of the swelling are well marked, particularly at the inferior margin, due to the gravitation of the contained serum. The swelling is firm to the touch until it has begun to subside, when it becomes "doughy," and will retain the impress of the finger for a few moments. It is always extremely painful, and the horse resents its being touched or cringes away from one's hand in fear.

In extreme cases the nose is protruded, the neck carried stiffly, and if suddenly moved or compelled to turn round, the horse will grunt or groan.

For diagnostic purposes such very marked local reaction is not necessary, the painfulness and the persistence of the swelling and increase in size after twenty-four hours is sufficient; the non-glanderous swelling will have much decreased in size or totally disappeared in twenty-four hours.

In exceptional cases the swelling will not commence until after twenty-four hours, and will then become prominent. In such cases the horse is glandered. In suspected horses it is therefore necessary to watch the swelling for at least forty-eight hours, provided a definite result is not earlier arrived at.

Often in healthy horses the only local trace of the injection of mallein is the displacement of a few hairs at the side of the needle puncture, but we may get a local swelling. "In horses that are not glandered the local swelling obtains its maximum size during the first fifteen hours, and by the twenty-fourth hour has almost entirely dis-

appeared. Its maximum diameter is usually about 3 in. or 4 in." (Directions for use of mallein issued by Royal Veterinary College, London.)

Porch says (*Veterinary Record*, April 20, 1907) "there is frequently a swelling with a vertical measurement varying from 4 in. to 8 in., but only an inch or two in width, not tense or painful. This kind of swelling I do not consider as indicating that the animal is suffering from glanders; in fact, the vertical measurement is deceptive and useless. So far as size goes, the horizontal measurement is the only one really significant."

I have frequently found a vertical swelling about the size of two fingers over the seat of inoculation, and attach no importance to it, even if it is present for forty-eight or sixty hours, provided it is not painful to the touch; neither do I regard as necessarily serious the tumefaction of two or more lymphatic vessels radiating from a small swelling at the seat of inoculation.

Hunting points out that in purpura hæmorrhagica the swelling rapidly forms, and is large by the twenty-fourth hour, but if the horse is not glandered it has disappeared in another twenty-four hours.

I have had an opportunity of making a *post-mortem* examination of a non-glandered and apparently healthy horse in which the local swelling was very marked at the twelfth hour, and had not disappeared at the fortieth hour. There was no rise of temperature in this case. The swelling was not painful and was diffused over the surface of the neck; it did not stand out prominently as the true glanders reaction does. This tumefaction of the neck was probably quite rightly attributed to the use of a dirty needle, or to some septic condition of the skin at the point of inoculation.

In estimating the value of the local reaction we have to take into consideration (1) its size and shape; (2) its rapidity of growth and duration; (3) its sensitiveness to the touch.

The thermic, thermal or temperature reaction consists in a rise of temperature of at least (two degrees) 2° F. within sixteen hours of the injection of mallein.

Professor M'Fadyean, in the directions for use of mallein already quoted, says, "provided the temperature was normal (under 101° F.) before the injection, it will rise two degrees or more (103° to 105° F.) during the next fifteen hours if the horse is glandered, but it will remain practically unaffected (under 102° F.) if the horse is not glandered."

But it must not be taken for granted that a horse whose temperature rises two degrees within sixteen hours of injection is necessarily glandered; indeed, I would not accept any rise of temperature in itself as sufficient evidence of glanders. To be diagnostic we must also have some local swelling amounting to a local reaction.

Opinions as to the times at which the temperature should be taken so as to get a record of its rise differ considerably. Thus in the directions for use of mallein already quoted it is directed that "the temperature must be taken at the ninth, twelfth, and fifteenth hour after injection." The Board of Agriculture, in its Circular to Local Authorities of August 26, 1907, name the sixth, ninth, twelfth, eighteenth and twenty-first hours. Hunting, in his work on "Glanders," says: "I do not think any useful information is missed by not visiting

the horse after injection until sixteen hours have elapsed." (Hunting, "Glanders," p. 63.)

My personal records include only three glandered horses in which the highest temperature was registered previous to the fifteenth hour, followed by a fall at that hour.

	Time of injection ° F.	Twelfth hour ° F.	Fifteenth hour ° F.	Eighteenth hour ° F.	Twenty-first hour ° F.
Bay gelding	101·8	105	104·8	—	104
Bay mare	99·8	106	105·8	105	—

In these cases the fall at the fifteenth hour is very small, and no useful information would have been missed if the twelfth hour temperature had not been taken.

The time at which the temperature of affected horses rises is variable. I have recorded a 2·2° F. rise—from 101·4° to 103·6° F.—at the sixth hour, and a rise of 4·6° F.—*i.e.*, from 101·4° to 106° F. at the ninth hour.

My experience is that although the temperature may rise in glandered horses previous to the sixth or ninth hour, it continues as high or higher until the fifteenth or sixteenth hour; or if, as in the two charts above, it falls between the twelfth and fifteenth hour, the decrease of temperature is so small as to be unimportant. But the highest temperature in glandered horses with a normal temperature at injection may not always be reached at the fifteenth hour. A dark bay gelding, shown by *post mortem* to be glandered, and having a temperature of 101° F. at injection, was 103·6° F. at the fifteenth hour, and 104° F. at the twenty-second and thirty-sixth hours.

In this case also the thermal reaction was sufficiently high at the fifteenth hour, and the indication given was not affected by the subsequent slight rise of temperature. For all practical purposes, if the temperature is normal at injection, the temperature recorded at the fifteenth hour of the test is decisive of the thermal reaction.

But in apparently identical cases of glanders the temperatures will vary to an extraordinary extent, as is shown by the following example: Two cart mares had been bought on the same day eight months previously from an infected stud. At the time of testing both were fat and in good condition, were at ordinary draught work in London, and apparently in good health. At *post mortem* both showed glanders nodules in both lungs; in each case several nodules were presented on longitudinal section of these organs, and in each the glanders lesions were confined to the lungs.

	Time of injection ° F.	Twelfth hour ° F.	Fifteenth hour ° F.	Eighteenth hour ° F.	Twenty-first hour ° F.
Grey mare	101	102·6	103·8	—	103
Bay mare	99·8	106	105·8	105	—

In each an indicative thermal reaction was given at the fifteenth hour, but the variation in the individual rise of temperature was very marked.

In glandered horses whose temperatures are above normal at the time of injection the subsequent temperature curves are very often irregular and a fall in temperature is frequently shown, as the following recently recorded charts will show:—

	Time of injection ° F.	Twelfth hour ° F.	Fifteenth hour ° F.	Eighteenth hour ° F.
Cab mare	103·4	102·2	104	103·6
Bay draught gelding ...	104	101·2	102·4	103·4
Bay cart mare	103·4	102·8	103·2	103·6
Bay cart gelding ...	103	101·8	102·2	103·4

All of these horses were shown by *post mortem* to be glandered. The first two were clinical cases, the last two were emaciated, but were at work up to a few hours before testing.

Hunting ("Glanders," p. 64) says: "It is inadvisable to make a mallein test of a horse with a temperature over 102·5° F. In cases where we test an animal with a temperature of 103° F. or higher, a fall of two degrees in twenty-four hours is a suspicious sign." Both these points are endorsed in the above charts.

The third—the systemic reaction—may be indicated by a depressed appearance, staring coat, irregular skin temperature, loss of appetite, hurried breathing, or stiffness of gait. Any, or all, of these indications may be found, and with other reactions are of great diagnostic value. On the other hand, such indications of systemic disturbance are not infrequently absent in horses which are glandered and which are exhibiting both the thermal and local reactions.

I would submit that when glanders is present in a horse, the injection of mallein is usually followed by a well-marked thermic and local reaction accompanied by some systemic disturbance, but that when such positive diagnostic indications are not all present a local persistent reaction of a painful nature is in itself diagnostic of glanders; that a well-marked rise of temperature unaccompanied by a precise local reaction is not conclusive, but if accompanied by systemic reaction is, in a member of an infected stud, of the gravest suspicion and would warrant us in advising the slaughter of the animal.

In cases where the evidence afforded by mallein is suspicious but not conclusive, we must re-test the animal. I have made such re-tests within a week with satisfactory results, using the opposite side of the neck for the injection; indeed, in one case I had both marked thermal and local reactions, although the swelling from the first reaction had not entirely disappeared.

The Board of Agriculture, in the Glanders and Farcy Order, state such re-test must be made within twelve days, but not earlier than ten days after the first test, and it is advised that a larger dose of mallein, say a dose and a half, should be used for the second test, and the withdrawal of all restrictions upon movement is permissible with regard to horses in which this second application of mallein does not result in definite evidence of the disease within forty-eight hours.

This appears to be a weak point in the Glanders or Farcy Order, and one of which I have practical experience. I consider it would be far safer if it were made compulsory that all horses known to have been exposed to infection should be re-tested at an interval of two months after the last reacting or clinically diseased horse has been removed from the stud.

It is known that there is a period after the invasion of the horse's body by the bacillus of glanders—the incubative period of the disease—in which he will not respond to the mallein test. What the exact incubative period may be is unknown; it probably varies in different

animals, for some individual horses have greater resistant power than others, either from increased natural resistance or from being in better circumstances of housing, feeding, or work. Also, the virulence of the virus itself, and the route by which it gains access to the body, may all influence the length of the incubative period. Cases of natural infection would be more prolonged than in experimental infection, except perhaps in those cases of farcy where the bacillus has found a direct entrance by means of a wound in the skin.

Hunting ("Glanders," p. 65) points out that Nocard experimentally infected a horse by feeding with glanders bacilli, but got no reaction to mallein until the twenty-first day, and that in some horses experimentally infected by Sir John M'Fadyean a reaction to mallein was given thirteen days afterwards.

He further says (*id em*): "We should probably be certain to detect all infected by repeating the test in any stud after the lapse of fourteen days."

But this important point must not be overlooked, that by frequently dosing a horse with mallein it will acquire a tolerance to it, so that mallein will cease to provoke a reaction. M'Fadyean says (*Journal of Comparative Pathology*, vol. xv., p. 86) "it was definitely established that when the mallein test is repeated at short intervals (a month or less) a horse may cease to react, although still glandered."

This power of acquiring tolerance to mallein must also be taken into account when used to indicate the recovery or non-recovery of a horse from glanders; so that when used for this purpose a considerable time must be allowed to intervene between the tests. The French Government require as an indication of recovery that a horse shall fail to react to the test on two successive occasions, at intervals of two months. A Committee of the Royal Agricultural Society reported "that in practice the mallein tests should not be repeated oftener than every three months when the object is to ascertain whether the animal has actually recovered from glanders." (*Journal of Royal Agricultural Society of England*, vol. lxiv., p. 273.)

This acquirement of a tolerance to mallein has led to the supposition that injections of mallein may with advantage be employed as a prophylactic of glanders. There does not appear to be any grounds for this supposition, neither do injections of mallein appear to exert any curative effect in glanders.

Mallein may be used for diagnostic purposes in horses, asses, or mules. Jowett points out ("Notes on Blood-Serum Therapy," p. 156) "that in testing mules double doses of mallein should be used." Doubtless some gentlemen present have had experience of this; fortunately, or unfortunately, it has never fallen to my lot to test a mule for glanders.

Tuberculin.

When a dose of tuberculin is given by subcutaneous injection, which is the method at present chiefly employed, the local reaction is so slight as to be unobservable in the living animal.

The manifest reactions we get to tuberculin are two—the systemic and the thermal.

The Systemic Reaction.—Well within twelve hours after an injection of tuberculin the infected cattle will usually show some signs of being

unwell, such as capriciousness of appetite and loss of inclination to chew the cud, with "staring coat," coldness of loins and rump, and arching of the back, rigors, and diarrhœa are often present, especially in milking cows, but these symptoms soon disappear. There is usually a falling off in the milk yield for twenty-four hours or so; in cases of severe reaction this diminution of the milk yield may be more marked. I have several times known the yield diminished by 50 per cent. for some days; indeed, in exceptional cases cows do not return to their normal milk yield until another calving; but the systemic reaction, even in animals badly affected with tuberculosis, is not always shown. Some diseased animals do not as a result of the injection (even though there is a considerable rise in temperature) experience any loss of appetite or in milk yield, or show any symptoms of ill-health.

The Thermal Reaction to tuberculin is a gradual rise of 2·5° F. (2½ degrees) above the average normal temperature. To obtain the average normal temperature of an individual animal it would be necessary to register it several times daily for three or four days.

Ainsworth Wilson (*Veterinary Record*, February, 1908) says: "The temperature taking might be commenced with advantage a week beforehand; the morning and evening temperatures, at any rate, for the three days preceding the test should be available." In a later paragraph this writer points out the great difficulty of making such prolonged observations in veterinary practice, and with this we all agree.

In the presence of such difficulties it is practically impossible to obtain the average normal temperature of the individual members of a herd, and under such circumstances we cannot do better than accept the figures issued by the Royal Veterinary College of London, in the directions for using their tuberculin, viz., "Animals in which the temperature rises gradually from the normal (between 101° and 102° F.) to 104° F., or more, may be classed as tuberculous."

Authorities vary somewhat in their opinions as to the periods at which the temperature should be registered. The Royal Veterinary College of London direct that "ordinarily the temperature must be taken at the times of injection, and at the ninth, twelfth, fifteenth and eighteenth hours afterwards." Some of the colonial and foreign governments, in the case of imported cattle, ask for charts showing the temperatures at the time of injection, and at the twelfth, fifteenth, eighteenth, and twenty-first hours. I consider the latter series of temperatures is the best.

Ordinarily a temperature which, though risen, has dropped by the twelfth hour would not be a positive, or even a suspicious reaction. An infected animal's temperature would not be on the decline at the twelfth hour, therefore in practice the first time at which it is usually necessary to take the temperature is at the twelfth hour. But is it sufficient to cease registering the temperature at the eighteenth hour? I have no doubt that mistaken diagnosis may arise by not prolonging the observation until the twenty-first hour. A recent case of my own in a tuberculous cow bears this out.

Time of injection ° F.	Twelfth hour ° F.	Fifteenth hour ° F.	Eighteenth hour ° F.	Twenty-first hour ° F.
102	100·6	102	103	104·4

On frequent occasions I have met gentlemen who cease taking

temperatures at the fifteenth hour; surely, in all animals passed as sound on such temperature observations the test has not been properly carried out!

In cases where the rise in temperature—for in healthy cattle there is usually some slight rise—has not much exceeded one degree, and has fallen by the eighteenth hour, there is no need to continue the observation, but where the temperature rises to 103° F. at eighteenth hour then, in my opinion, we are not justified in leaving the twenty-first hour temperature unobserved.

A practice I personally like is to take the temperature six or nine hours before, as well as at the time of injection, and at the same time on the day following the injection; we are thus able to compare the temperature of the eighteenth and fifteenth hours after injection with that of the same time of the previous day. But not all cattle in which there is a rise from a normal initial temperature to 104° F. must be regarded as tuberculous. A sudden rise in the temperature to this point or more, with an equally rapid fall—a sudden jump in the temperature—is usually associated with some other morbid condition than tuberculosis. The ideal chart of tuberculin reaction should have a good curve; the temperature should commence to rise between the sixth and ninth hour, should continue to gradually rise, have some persistence at its highest point, and then gradually fall.

For the preparation of this paper I have recorded the evening temperature of 340 cows, apparently in good health. It is obvious that in dealing with so large a number of animals varying conditions of lactation, pregnancy, œstrum, and general environment must have been included, also the animals must have been differently circumstanced as regards feeding, ruminating, drinking, and resting, all of which have some influence on the temperature, Only seven of these cows registered below 101° F. (the lowest point reached being 100·4° F., and occurring in two cows). The temperature of fifty-five exceeded 102° F., and that of 278 varied from 101° to 102° F.

The evening temperature of yearling bulls and heifers exceeds that of cows; in such an evening temperature, not exceeding 103° F., cannot be regarded as abnormal, and I always without hesitation test such animals, but it is not advisable to test a cow or stock bull whose evening temperature by much exceeds 102° F.

The temperature of young calves, especially those fed from the pail, is very inconstant. In a herd of ten, all in apparent health, the evening temperature varied from 99·8° to 104° F. It is well known that from indigestion and other slight causes the temperatures of these young animals often varies to an extraordinary extent within twenty-four hours. This erratic tendency of the temperature of calves makes the testing of such animals untrustworthy and undesirable.

It is common to hear stock owners and cattlemen say they do not believe in the tuberculin test, and point out that a certain animal or animals failed to pass in January and passed in July, or *vice versa*. There should be nothing in this to shake one's faith in the test. It is possible for an animal to recover from tuberculosis in a few months, and it is certain that any animal may become infected with this disease at any time, but the incredulity of the layman is to an extent justified both by the accuracy and the inaccuracies of the tuberculin test.

Let me deal first with the latter. It must not be overlooked that a considerable period of time elapses between the invasion of the body by the tubercle virus and the capability of the animal to respond to an injection of tuberculin; experiments to determine the length of this period have been carried out by Sir John M'Fadyean, the Royal Agricultural Society, and by Nocard and Rossignoll. These experiments proved that the period which elapses after infection before a distinct reaction to tuberculin can be obtained is very variable, and may be anything from eight days to over seven weeks. (*Journal of Comparative Pathology*, vol. xiv., p. 71). During this period—the period of incubation—the tuberculin test may fail to indicate the presence of the disease. It is well known also that it may fail, and often does fail, to produce a reaction in animals far advanced in the disease; the probable explanation of this being that such highly tuberculous animals have themselves produced and hold in their organisms so much tuberculin that they are unable to respond to the test.

Then, again, the presence of, or the occurrence during the period of testing of other diseased or abnormal conditions may, as has before been pointed out, cause such variations of temperature as to negative the value of the test or lead to wrong deductions. We know also that cattle are tampered with by unscrupulous persons, who having become aware that repeated injections of tuberculin produce a certain amount of tolerance to its presence, do not hesitate to inject and re-inject an animal until for a time it will cease to react. The exhibition of febrifuge drugs and cold water, either swallowed or locally applied, may so reduce the temperature as to render the test misleading. Excitement, either sexual or from strange surroundings, and the near approach of, or the act of, parturition, will sometimes (not always) disarrange the test.

With all these opportunities of error, is it to be wondered at that diagnoses based on the tuberculin test are sometimes wrong?

The very accuracy of this test is also liable to mislead the inexperienced non-professional man, because an animal which has recent and few tubercular lesions will frequently show a very marked reaction; its temperature will go to 106° F. or even higher, and it may be decidedly unwell for twelve or twenty-four hours; on *post mortem* no tubercular lesion may be found, and the test is quite wrongly said to have failed. Veterinary surgeons who know the power possessed by the tubercle bacillus to take up its habitat and grow in practically all organs, tissues, and membranes of the animal body will not assert that the test has failed, but will recognize that the lesion or lesions have been overlooked. Personally, after diligent search the only evidence we have found in some cases has been caseation in some small lymphatic gland.

Professor Dewar (*Veterinary Record*, 1907, p. 702) has said "Even although in *post mortem* he might have had cases where he could not find a trace of tuberculosis, he felt that the fault was his, and did not rest with the tuberculin." Romer (*Revue Générale de Médecine Vétérinaire*, 1906, p. 554) is of opinion that "the results shown by tuberculin injection are to be preferred even to the statistics obtained at abattoirs."

Usually the country veterinary practitioner has not the necessary opportunities or means for making a thorough *post-mortem* examina-

tion. *Post mortems* on cattle at private slaughter-houses where carcases are to be subsequently used as food are altogether inadequate; yet this is the usual examination we have to conduct. We are not even permitted to open up possible seats of lesion, so that unless the *locale* of the disease is in the viscera or on the visible membranes, it is impossible to satisfy a layman that an error has not been made. For this reason it is perhaps not wise (as is done in mallein testing) to order the slaughter of reacting animals on the evidence of the tuberculin test alone. Another reason is that the lesion causing the reaction may be so small that if the animal is allowed to live it will recover, and cease to give a reaction to tuberculin.

I would be satisfied that such recovery had taken place in an apparently healthy animal if at two subsequent testings at intervals of two months there was no reaction shown.

Have injections of tuberculin any curative value in tuberculosis? This is a point upon which opinion is divided. Personally, I believe I have seen beneficial effects result from its use in tuberculous diarrhœa of cattle. Then, again, some practitioners have asserted that the injection of tuberculin in young animals will act as a prophylactic of tuberculosis. I do not credit it with such power.

The tolerance which cattle may obtain to the action of tuberculin has been alluded to, and it is important to know at what period after a first testing a re-test may safely be made. I have experience of cows which have reacted to the test twice within a week, but there is no doubt that injections repeated at so short an interval will not always prove successful in inducing a reaction. Nocard, who carried out extensive experiments, found (*Journal of Comparative Pathology*, vol. xvi., p. 67) that when the injection was repeated after an interval of one or two days, only one-third of the animals reacted; when after eight days not more than half reacted; but when fourteen days were allowed to elapse about two-thirds of the animals reacted. An interval of twenty-five to thirty days after the first reaction was required in order to insure a typical reaction occurring in all animals on the second injection.

In France also Vallée has made investigations into the fraudulent use of tuberculin by unscrupulous cattle dealers, and instituted experiments for the purpose of devising a method of testing animals which may have been to some extent protected by the prior injection of tuberculin.

As a result of these experiments, he advises that cattle which are suspected of having been tested a short time previously, should at the second test receive a double dose of tuberculin, and that their temperatures should be taken from the second hour after injection every two hours up to the fourteenth or fifteenth hour. He points out that under such conditions tuberculous cattle almost always react to a second injection, even if the interval between the tests is only thirty-six or forty-eight hours. Such reaction is intense, occurs at a very early period, and is very transitory; that whereas the temperature curve of a first injection is prolonged, that of a second test is indicative of a sudden transitory rise of temperature, so that after the twelfth hour it furnished little guidance (*Revue Générale de Médecine Vétérinaire*, vol. xl., p. 161).

In the *Journal of Comparative Pathology* for March last, Jowett

confirms Vallée's observations; he says that he "has found this method eminently serviceable. On several occasions on which it has been practised the majority of reactors exhibited the maximum rise of temperature about the seventh hour after injection, *i.e.*, when the test had been carried out in accordance with Vallée's directions."

Vallée also states that even in cows affected with pulmonary or mammary tuberculosis repeated reactions may be obtained by this method of testing (*idem*).

Personally, I consider that for the diagnosis of mammary tuberculosis the ordinary method of tuberculin testing is of very little or no use.

The following chart of an apparently healthy cow, except that she had a chronic enlargement (hypertrophy) of one hind quarter of her udder, and whose temperature under the test rose only to 103·4° F. bears this out.

Time of injection	Twelfth hour	Fifteenth hour	Eighteenth hour	Twenty-first hour
° F.	° F.	° F	° F.	° F.
101·8	103	103	103·4	102·8

In this case the rise of temperature only amounted to 1·6° F., and did not reach to 104° F., so that on her chart the cow could only be regarded as suspicious of tubercle, yet the milk yielded by the enlarged quarter of her udder contained great numbers of tubercle bacilli.

Then, again, cows affected with some form of sporadic mastitis and whose udders are free from tuberculosis may react to tuberculin owing to the presence of lesions in some other parts of their bodies, and thus deceive the operator.

For the diagnosis of tubercular mastitis we must rely on clinical examination of the animal and the microscopical or biological testing of the products of the suspected quarter.

During the past two years some new methods of tuberculin and mallein testing have been exciting much attention. They consist in the local application of tuberculin or mallein to the skin or mucous membranes.

In the skin or cutaneous method, which is known by various terms, such as endermic, dermic, or cuti test, a portion of the skin which the animal cannot well reach or rub—such as the sides of the withers or the back of the neck—is selected; after being shaved and cleansed, it is scarified to such a depth as to give rise to a slight oozing of blood and is then painted with tuberculin.

In operating in this way, Vallée found in tuberculous animals a very manifest cutaneous reaction by the twenty-fourth hour, which still increased and was most distinct about the forty-eighth hour, and persisted with very marked characters four and five days after the operation.

He also found that "when strong mallein is diluted with an equal volume of boiled water and applied to à scarified area on the neck of a non-glandered horse, it does not provoke any reaction; but in three glandered horses similarly tested a very distinct local œdematous reaction was obtained from the ninth hour. Here, however, contrary to what is observed in the cuti-reaction to tuberculin, the phenomena

disappeared very rapidly." (*Revue de Médecine Vétérinaire*, vol. lxxxiv., p. 308.)

I am not aware that any British veterinary surgeon has published any record of the dermic form of mallein testing, but Trotter, of Glasgow, has conducted some very interesting and valuable experiments with the object of investigating the reliability of this method of tuberculin testing when applied to animals with an abnormal temperature. (*Journal of Comparative Pathology*, vol. xxi., p. 153.)

Mr. Trotter scarified a portion of skin about the size of a penny at the base of the skull and applied the tuberculin with a camel-hair brush. In the experiment he tested thirty-one animals, and *post-mortem* examination proved the test to have been accurate in twenty of them.

Reinecke, a German investigator, was not even so successful as Trotter. Of twenty-five animals submitted to skin inoculation, one showed a trifling skin reaction, this animal appeared on slaughter to be free from tuberculosis; of the other twenty-four animals which showed no reaction, eight were infected with tuberculosis. (*Journal of Comparative Pathology*, September, 1908, p. 257.)

The evidence available at present points to this scarification test being much less reliable than the ordinary subcutaneous test.

For the local application of tuberculin or mallein to a mucous membrane, the conjunctiva is usually chosen; hence it is known as the conjunctival or ophthalmic test.

This method of testing appears to have been extensively employed for the diagnosis of tuberculosis in the human subject, and it has been the subject of much experimental work by veterinary surgeons.

Jowett advises that for applying this test the animal's head should be raised, the eyelids separated, and seven or eight drops of tuberculin dropped on to the eye by means of a pipette, or, as an alternative method, the raising of the upper eyelid and applying the tuberculin direct to the globe of the eye by means of a small camel-hair brush.

This test should be performed only on one of the eyes, the opposite eye being used as a control. He further points out that for this purpose one must use tuberculin to which glycerine has not been added in the process of preparation, as glycerine has an irritant action on the conjunctival membrane. (*Journal of Comparative Pathology*, March, 1909, p. 16.)

The reaction consists in the appearance in from eight to twenty hours of conjunctivitis; it is not attended with a rise of temperature.

We are again indebted to Trotter for experimental work in connection with this method of testing. In the *Journal of Comparative Pathology and Therapeutics* for June, 1908, he gives the result of this test on thirty-eight animals upon which he has operated, and states "The results of this series of experiments show that tuberculin brought into contact with the conjunctival mucous membrane is not so reliable a diagnostic agent as when it is injected subcutaneously."

A French committee has also reported unfavourably on the ophthalmic test. It points out "In bovines the ophthalmic test alone is a very untrustworthy method, and cannot pretend to replace the ordinary subcutaneous method."

The ophthalmic test for glanders has been very little used, and also appears to be of doubtful value.

INFECTIOUS ANÆMIA OR SWAMP FEVER OF HORSES.[1]

BY JOHN H. MOHLER, V.M.D., CHIEF OF THE PATHOLOGICAL DIVISION, BUREAU OF ANIMAL INDUSTRY.

INFECTIOUS anæmia of horses, known also by a number of other names, as swamp fever, American surra, malarial fever, typhoid fever of horses, the unknown disease, no-name disease, plains paralysis, and pernicious anæmia, has recently been the subject of much investigation. The cause of the disease has now been definitely determined as an invisible virus, which is capable of passing through the pores of the finest porcelain filters, like the infection of foot-and-mouth disease, rinderpest, hog cholera, and similar diseases. The disease is most prevalent in low-lying and badly-drained sections of the country, although it has been found in altitudes as high as 7,500 ft. on marshy pastures during wet seasons. Therefore proper drainage of infected pastures is indicated as a preventive. It is also more prevalent during wet years than in dry seasons. It usually makes its appearance in June, and increases in frequency until October, although the chronic cases may be seen in the winter, having been contracted during the warm season.

CAUSE OF THE DISEASE.

It has been conclusively proven that infectious anæmia is produced by an invisible, filterable organism which is transmissible to horses, mules, and asses by subcutaneous inoculation of blood-serum. The virus which is present in the blood may be transmitted to a number of equines in a series of inoculations by injecting either the whole blood, the defibrinated blood, or the blood-serum which has been passed through a fine Pasteur filter, thus eliminating all the visible forms of organismal life, including bacteria, trypanosoma, piroplasma, &c. This virus has also been found to be active in the carcase of an affected animal twenty-four hours after death.

Following the injection of the infectious principle there is a period of incubation, which may extend from ten days to one and a half months, at the end of which time the onset of the disease is manifested by a rise of temperature. If uncomplicated, the infection runs a chronic course, terminating in death in from two months to one and a half years, or even longer. The probability of the virus being spread by an intermediate host, such as flies, mosquitoes, internal parasites, &c., is now receiving careful investigation.

From experiments already conducted it appears that this disease, formerly supposed to be confined to Manitoba and Minnesota, is more or less prevalent in Kansas, Nebraska, Colorado, Wyoming, Montana, North Dakota, and Texas. It also occurs in Europe, having been reported in Germany under the name of infectious anæmia and in France as infectious typho-anæmia.

SYMPTOMS.

The disease is characterized by a progressive pernicious anæmia, remittant fever, polyuria, and gradual emaciation in spite of a voracious appetite. It begins to manifest itself by a dull, listless appear-

[1] Issued by the United States Department of Agriculture.

ance and by general weakness, the animal tiring very easily. This stage is followed closely by a staggering, swaying, uncertain gait, the hind legs being mostly affected. There is also noted a weakness and tenderness in the region of the loins, and at the same time the pulse increases in rapidity, and may run as high as 70, though weak, stringy, and intermittent. The temperature may rise to 103° F. or higher, remaining high for several days, and then dropping, to rise again at irregular intervals. Toward the end of the disease the temperature occasionally remains persistently high. The horse may improve for a time, but usually this temporary improvement is followed by a more severe attack than the first. Venous regurgitation is sometimes noticed in the jugular before death. The quantity of urine passed is enormous in some cases. Death finally occurs from exhaustion or syncope.

The blood shows a slight decrease in the number of white blood-cells, while there is a gradual but marked diminution of red corpuscles, the count running as low as 2,000,000 per cubic millimetre, the normal count being 7,000,000. If the blood is drawn from such an animal the resulting red clot will be about one-fifth of the amount drawn. Occasionally a slow dripping of blood-tinged serum from the nostrils is observed as a result of this very thin blood oozing from the mucous membranes. Petechiæ, or small hæmorrhagic points, are sometimes noticed on the nictitating membrane and conjunctiva of the eye, while paleness of the visible mucous membranes of the nose and mouth is usually in evidence, although they may have a yellow or mahogany tinge. Often a fluctuating, pendulous swelling may appear on the lower lip, point of elbow, sheath, legs, under the belly, or on some other pendant portion, especially late in the disease, which is indicative of poor circulation, thinning of the blood, and consequent loss of capillary action.

Lesions.

After death the carcase is found to be very emaciated and anæmic, the visible mucosa being very pale. This marked absence of adipose tissue makes the skinning of the animal a difficult task. Subcutaneous and intermuscular œdema and hæmorrhages are frequently observed, although it is remarkable in many cases to see how few macroscopic lesions may be present. The predominating and most constant lesion is probably the petechiæ, so often observed in the muscle or on the serous membranes of the heart. The heart is generally enlarged, and may be the only organ to show evidence of disease. In other cases the lungs may be studded with petechiæ, with a serous exudate present in the thoracic cavity. In addition to the petechiæ already noted, the pericardial sac generally contains an increased amount of fluid. The abdominal cavity may show peritonitis and a hæmorrhagic condition of the intestines, which probably result from overfeeding in consequence of the ravenous appetite. The liver sometimes presents a few areas of degeneration, although usually normal. The spleen is at times found to be enlarged and covered with petechiæ. The kidneys may appear normal or anæmic and flaccid, but microscopically they usually show a chronic parenchymatous degeneration. The lymph glands may be enlarged and hæmorrhagic.

Diagnosis.

The diagnosis of the disease is not difficult, especially in advanced stages. The insidious onset, remittent fever, progressive emaciation and anæmia, unimpaired or ravenous appetite, staggering gait, and polyuria, are a train of symptoms which make the disease sufficiently characteristic to differentiate it from other diseases affecting horses in this country. The peculiar relapsing type of fever, the great reduction in the number of red blood-cells, and the absence of eosinophilia are sufficient to differentiate it from the anæmias produced by internal parasites, while it may be readily distinguished from surra by the nonsusceptibility of cattle and by the great ease with which the trypanosoma may be found in the latter affection.

Prognosis.

The prognosis of the disease is very unfavourable. Veterinarians in different sections of the country where it is prevalent report a mortality of 75 per cent., or even higher. Recovery takes place only when treatment is begun early or when the animal has a long convalescent period.

Treatment.

The treatment of the disease has so far been far from satisfactory. The iodide, permanganate, and carbonate of potash have been used. Arsenic, atoxyl, quinine, and silver preparations have been suggested, but all have uniformly been without success. Intestinal antiseptics have been resorted to, and the results are encouraging but not altogether satisfactory. Symptomatic treatment seems to be the most dependable. For instance, Davison of this Bureau was able to reduce greatly the mortality from this affection by giving an antipyretic of 40 gr. of quinine, 2 drachms of acetanilide, and 30 gr. of powdered nux vomica four times daily. In the late stages with weak heart action alcohol should be substituted for acetanilid. Cold water sponge baths may be given, and in addition frequent copious injections of cold water *per rectum*, which has a beneficial effect in reducing the temperature and in stimulating peristalsis of the bowels, which, as a result of the disease, show a tendency to become torpid during the fever. Avoid giving purgatives unless absolutely necessary, on account of their debilitating effect, but instead give laxative, easily digestible foods. Not infrequently a dirty yellowish tinge of the visible mucous membranes has been observed, in which cases 20 gr. of calomel in from 2 to 4 drachms of aloes in a ball, or 2 drachm doses of fluid extract of podophyllin may be given. Following the subsidence of the fever a tonic should be administered composed of the following drugs in combination:—

Arsenious acid	2	grammes.
Powdered nux vomica	28	,,
Powdered cinchona bark	85	,,
Powdered gentian root	110	,,

These should be well mixed and half a tablespoonful given at each feed to the affected animal.

As in the case of all other infectious diseases, the healthy should be separated from the sick horses, and thorough disinfection of the

infected stable, stalls, litter, and stable utensils should be carried out in order to prevent the recurrence of the disease. As a disinfectant the compound solution of cresol, carbolic acid, or chloride of lime may be used by mixing 6 oz. of any one of these chemicals with 1 gallon of water. One of the approved cold-tar sheep dips might also be used to advantage in a 5 per cent. solution (6 oz. of dip to 1 gallon of water). The disinfectant solution should be applied liberally to all parts of the stable, and sufficient lime may be added to the solution to make the disinfected area conspicuous.

Investigations are now in progress with a view of producing a vaccine or serum that will protect horses which have been exposed to the disease.

EQUINE BILIARY FEVER.

(Pyroplasmosis equi).

BY C. H. H. JOLLIFFE, F.R.C.V.S., VETERINARY-CAPTAIN, 1ST LIFE GUARDS, WINDSOR.

(*Continued from p.* 349.)

Inoculability, Immunity, and Methods of Infection.

Here again we are entirely indebted to the exhaustive investigations of Dr. Theiler, the value of whose researches, not only into this disease, but in the whole field of tropical veterinary medicine, cannot be over-estimated.

In 1902 and 1903 it was reported by this authority (*Journal of Comparative Pathology and Therapeutics*, vols. xv., part i., and xvi., part ii.) that he was quite unable to transmit the disease artificially from one horse to another. He mentions the possibility that this might be accounted for by the causal organism having to undergo a phase of development in a tick or insect before being able to infect a fresh animal, as is the case with the pyroplasma parvum of East Coast fever. On the other hand, bearing in mind the *immunity* of oxen born in a redwater district against bovine pyroplasmosis, he strongly suspected that it was really due to an immunity on the part of his experimental animals (which were all South African bred), though proof was wanting.

In the *Journal of Comparative Pathology and Therapeutics* of September, 1905, he publishes further notes apparently indicating the correctness of this last-mentioned surmise, viz., that his inability to reproduce the disease by the injection of virulent blood was due to immunity on the part of the horses injected. For here he shows that as soon as he had obtained freshly-imported, and therefore susceptible, animals from the Argentine, he could at once convey the disease by intravenous or subcutaneous injection of virulent blood to these animals. The virulent blood was obtained from what are described as "immune" animals, these being horses which are shown to have undergone an attack of the disease. The experiments thus demonstrate, additionally, the important fact that the blood of animals recovered from the disease remains infective to others. Further, having also imported mules and donkeys, he found the disease intercommunicable between all three species of the genus *Equus*.

It would thus appear, so far, that at any rate a large majority of animals born and bred in countries where biliary fever is rife are immune to the disease. Not only was it impossible to artificially infect what may presumably be regarded as a "fair sample" of them, but there is also, as previously mentioned, clinical evidence showing that it is the imported, and not the country-bred, animals which fall victims to the naturally contracted disease.

Now is this immunity absolute, and how is it arrived at?

According to Theiler's latest researches [16], it certainly is not absolute. In the *Journal of Comparative Pathology and Therapeutics* of June, 1908, there are details of numerous experiments on protective inoculation against equine pyroplasmosis, in which fifty-five Transvaal animals (horses, foals, mules, donkeys, and donkey foals) are injected with the blood of animals which had been through an attack of the disease. Of these there appears to be only one that did not react; all the remainder had temperature reactions, some showed jaundice, and in all pyroplasmata were found in their blood. In most of these cases, too, the infected animals were not inoculated *directly* with infective blood, but indirectly, *i.e.*, after passing through various series of young *Equidæ*. One three-year-old Transvaal mule died from pyroplasmosis after being injected with the blood of a Transvaal foal which had been infected from an Argentine horse, the latter having been infected from a country-bred donkey which had recovered from an attack of the disease. It is surprising, therefore, to find that Theiler makes no mention (apparently) as to how he reconciles these facts with his previous total inability to infect South African horses in 1903 (*vide Journal of Comparative Pathology and Therapeutics*, vol. xvi., pp. 101, 102), since the contrast is so very marked.

There is no doubt that animals which have been through an attack of the disease are, except for one, or perhaps two, subsequent relapses, perfectly immune. Although experimental data establishing the fact do not appear to be recorded in the *Journal*, yet it is expressly stated that this is so by Theiler in 1905 (*vide Journal of Comparative Pathology and Therapeutics*, vol. xviii., pp. 229-239). The probability is, therefore, that all the South African animals which he tried to infect in his 1903 experiments had been through an attack of the disease, and the following would seem a not unlikely explanation of the apparently conflicting results reported, and would at the same time harmonize with the alleged rarity of native-bred animals becoming naturally (and "clinically") affected with the disease. We must suppose that animals born in South Africa inherit, or acquire very soon after birth, a certain or relative degree of immunity. If left free on the "veldt" and exposed to gradual infection, this immunity may increase step by step, or perhaps culminate in a mild attack of the disease—in most cases so mild, probably, as to produce no gross evidence of illness. In either event a sufficient degree of resistance is eventually obtained to render the animal proof against natural methods of infection, and in some cases—particularly those in which an actual attack has supervened—even against injections of considerable quantities of virulent blood, of which latter class Theiler's 1903 animals happened, presumably, to be composed.

Up to the present, then, we may take it to be established (1) That *P. equi* is inoculable to susceptible animals; (2) that it is inter-

communicable between horses, mules, and donkeys; that the disease is, in fact, identical in all three species; (3) that native-bred animals may be held to possess a certain degree of immunity, or, in other words, to be less susceptible to the disease than imported animals; such relative immunity to all appearance varying considerably in different individuals, and depending, perhaps, on whether or not opportunity admits of their undergoing a gradual process of natural "vaccination" from the time of their birth. If no such opportunity occurs (as in the event of a foal being born and brought up in a pyroplasma-free or tick-free area), then a recognizable attack of the disease ensues on sudden exposure to subsequent experimental (or possibly, though rarely, natural) infection. (4) That one attack (with perhaps one or two relapses) confers immunity in *Equidæ* of all classes and breeds; (5) that the blood of animals which have survived an attack remains infective.

Methods of Infection.

South Africa seems to be the only country where this has been investigated, and, so far as I am aware, the report of Dr. Theiler in the *Journal of Comparative Pathology and Therapeutics*, vol. xix., part iv.) constitutes the sole authentic information up to the present available.

In all the pyroplasmoses in which the method of infection is known the disease has been found to be transmitted by ticks from one animal to another, and, as Theiler says, it was a matter of course to expect that equine pyroplasmosis was also transmitted by some species of *Ixodidæ*. He accordingly endeavoured to ascertain which was the species, and *Rhipicephalus evertsi* and *R. decoloratus* being the varieties that there was most reason to suspect, he proceeded to conduct experiments with these. As a result, he found that the *R. evertsi* transmitted the disease in its adult stage after feeding as larvæ and nymphæ on an infected horse in seven cases out of nine, whilst the *R. decoloratus* failed to transmit equine pyroplasmosis in any instance. It is thus established that *R. evertsi* may convey the disease in South Africa, and is probably the common medium in natural cases, though further investigations into the subject are evidently required.

In India I do not know of any experiments bearing on the method of infection having been carried out. From information kindly furnished me by Captain F. S. H. Baldrey, F.R.C.V.S., I.C.V.D., and Mr. R. E. Montgomery, M.R.C.V.S., it appears that the *R. evertsi* has not up to the present been recognized in India, the commonest horse-ticks in that country being, according to these authorities, the *Hyalomma ægyptium* and *R. sanguineus*. The latter (together with several other morphologically similar species) is closely allied to the *R. evertsi*, and, according to Baldrey, it is very likely to constitute a common intermediary agent in propagating the disease in India.

A noticeable feature, however, in connection with equine pyroplasmosis is the fact that so far as the essayist's experience in India is concerned, the cases he met with all occurred either in troop horses of the Royal Artillery, or else in officers' chargers, whose repeated grooming and cleanly condition, coupled with the careful attention invariably bestowed on their skins and coats, reduces to an absolute minimum the possibility of attack by ticks.

Identically the same observation was made by Captain A. J. Williams [10], who states: "It is interesting to note that in India the disease occurs among a class of animals which are, as a rule, free from ticks. There are ticks in the districts, but the animals are never tick-infested as one understands the term. A tick or two are occasionally found on the animals, but they are so well cared for that when any ticks do find their way on to them they are quickly removed. This refers to army remounts and polo ponies, among which my experience has chiefly been obtained."

The possibility, therefore, that there may perhaps be some additional agency other than ticks connected with the spread of the disease in equines, might be worth considering. In India at certain seasons of the year horses are in many districts tormented to distraction by countless forms of blood-sucking flies and winged insects of every description which abound in myriads, and of these some may be found to contain almost a drachm of blood if crushed after feeding. Now in view of the fact that the disease may be conveyed through the medium of a hypodermic syringe, can we be sure then that these voracious diptera are all innocent with regard to its natural transmission?

Connected with the question as to the mode in which the disease spreads, or in what manner a horse may become infected, a somewhat striking incident which occurred in the writer's experienceat Meerut, in India, might be worth recording. Three private horses (Australians, well-groomed and apparently tick-free) occupying one stable and standing next to each other were reported to be ill on the evening of June 9, 1906, having, according to the available history of the cases, all become attacked simultaneously. All three were found to have high temperatures ranging from 104° F. to 106° F., and they subsequently all three developed, and oddly enough *died*, from unmistakable biliary fever. Two of them died on June 18, and the remaining one on the 20th. The course of the disease and *post-mortem* appearances were almost identical in each instance, these being amongst the cases quoted where a limited area of pneumonia affecting the apices of the lungs was a complication of the disease.

Period of Incubation.

This was found by Theiler in experimental cases in South Africa to range from five to six days [22].

Treatment.

Quinine is deserving of an extended trial. Although Lignières found that it was useless in checking the progress of the disease in bovine redwater [17], and it is also said to be without effect on the hæmosporidia of birds and reptiles [17], yet by reason of its unquestionable efficacy in all forms of human malaria, its administration n equine pyroplasmosis would seem to be justifiable, at any rate until such time as its efficacy can be definitely disproved, Theiler in 1902 stated [5] that there is no doubt that the pyroplasms diminish in number, and may be made to disappear entirely by a systematic course of this drug.

The course and severity of the disease varies greatly, and there is no question but that a very considerable proportion of cases would

recover without any treatment at all. In order therefore to prove the value or otherwise of any given drug, it would have to be tried on a particularly wide and extensive scale, and results accurately noted before any reliable conclusion can be arrived at. As far as I am aware there are no published records of any such experiments up to the present.

In my own limited experience I had little evidence of any value in quinine, though others would seem to have had good results from its use. If employed it should be given in doses that are likely to have some physiological effect, and 1 to 2 oz. of the sulphate in twenty-four hours would be a rational and not excessive dose for oral administration. It is certainly more than is usually prescribed by veterinary surgeons, but if we consider that as much as a drachm may be hypodermically administered to the human subject, and with good effect, within that period (Manson) [18], then eight to sixteen times that quantity would scarcely be too much for a horse, if we may compare with quinine the relative doses of a few other common drugs as shown in the following table:—

	Average human dose		Average equine dose	
Aloe barb.	grs. iii.	℥v.	= ×	100
Magnes. sulph.	℥ii.	ʒviii.	= ×	32
Strychnine	gr. $\frac{1}{30}$	gr. i.	= ×	30
Tinct. opii	♏. xv.	ʒi.	= ×	32
Chloral. hydras. ...	grs. x.	ʒi.	= ×	48
Liq. arsenicalis ..	♏. v.	℥iv.	= ×	48
Potass. nitras.	grs. x.	ʒvi.	= ×	36
Atropine	gr. $\frac{1}{100}$	gr. $\frac{1}{4}$	= ×	25
Quinine sulphas. ...	grs. xl. × 20 (only !)	= over ℥iss.		

Wallis Hoare gives 1 to 2 drachms as the "antipyretic" equine dose of quinine sulph. Is it not logical to suppose that this would be likely to have about as much effect on a horse as an "antipyretic" as 5 to 10 grains of aloes would have as a purgative in the same species of animal?

The quinine should be administered in bolus to ensure a known quantity entering the patient's system, or the method of hypodermic or intramuscular injection might be further tried. The latter (*aseptically* carried out of course) has been favourably reported on in human medicine [19], and is, I believe, being more and more frequently adopted; though in a few cases in which the writer employed this method in horses, using the most readily soluble salt, the acid-hydrochloride, the results were not very satisfactory.

An important indication in the treatment is to sustain the heart's action, to which end the patient should be kept as quiet as possible, and such agents as strychnine, digitalis, caffein, alcohol, and ammonia, combined or otherwise, may be advantageously prescribed if required. They might be conveniently given hypodermically in the form of, say, ¼ grain of digitalin and 1 grain of strychnine in tabloid form, dissolved in an ounce or two of brandy, and injected twice daily. Or caffein and digitalin might be given hypodermically, and ammon. carb. combined with pulv. nucis vom. in bolus.

Constipation must be corrected by suitable laxatives, such as magnesium or sodium sulphate, linseed or castor oil, or both in equal parts, or small doses of aloes with calomel, the first two and the last-mentioned being probably useful in all cases. Ammonium chloride,

alone or in combination with ext. belladonnæ is recommended by many (Hutcheon in South Africa, Pallin in India, &c.), and though seemingly more or less empirical, it is largely employed. Arsenic, too, is possibly a useful remedy, and stimulant diaphoretics such as the spirit of nitrous æther and liquor ammon. acetatis might be also rationally employed as adjuncts in the treatment. It may be mentioned, however, that the forcible administration of medicines is a practice to be avoided as far as possible, and that the continual worrying of the patient with drenches, &c., is very apt to do more harm than good.

As to whether, in cases where there is a considerable degree of pyrexia, such antipyretics as phenacetin, phenazone, or acetanilide, should be administered there may be some difference of opinion. At first sight they may appear to be indicated, but in consideration of the fact that they would tend to markedly depress the cardiac action if given in doses of sufficient size to attain the object sought (viz., reduction of temperature), they are probably contraindicated. Manson does not seem to regard them with much favour in the treatment of human malaria, and he describes them, in reference to cases of hyperpyrexia as "worse than useless." On the other hand, he strongly advocates cold baths and sponging, and the external application and rectal injection of cold and iced water, &c., procedures which are universally adopted by medical practitioners in all cases where the temperature attains any considerable height, and which might be equally advantageously employed in the same circumstances in equine veterinary practice. Good nursing and favourable hygienic surroundings are obviously of first importance, and care should be observed with regard to sufficient and suitable nourishment being taken.

Prophylaxis.

Theiler is the only authority who has published any observations on the prophylaxis of biliary fever. These appear in Part ii. of the *Journal of Comparative Pathology and Therapeutics*, vol. xxi., 1908, where there is an exhaustive account of his experiments on protective inoculation against the disease.

In a former communication [20] he showed that the non-immune horse was extremely susceptible to pyroplasmosis produced by the injection of blood from an immune (*i.e.*, "recovered") horse, and he considered that this as a means of preventive inoculation was far too risky to be of any practical value. He observed, however, that the inoculation of horses with the blood from immune donkeys produced milder results, and he formed the opinion that this might prove a practicable method for the inoculation of horses. But this view he evidently altered prior to his 1908 publication, for there he states that the inoculation of horses with immune donkey blood may be followed by disastrous results; and he goes on to describe further experiments for protective inoculation which were based on the observation made in connection with bovine redwater, viz., that the inoculation of cattle with the blood of a calf immune against this disease is not so frequently followed by strong reactions and mortality as when the blood is derived from a full-grown beast. He accordingly utilized the blood (*a*) from immune weaned horse foals, and (*b*) from immune unweaned donkey foals, the immunity of these young animals being

brought about by one of three methods: (1) by inoculating them with the blood of an immune (*i.e.*, "recovered") horse; (2) by inoculating them with the blood of an immune mule; and (3) by inoculating them with the blood of an immune donkey. He further made a number of experiments as to the effect of passing the blood through various generations of horse and donkey foals. Thus, in one series of experiments, blood originally commencing from an immune horse was used for inoculating four foals, the blood from these foals being subsequently injected into eight horses, the latter constituting the "second generation." Of these eight five died, though not all directly from pyroplasmosis. In another series, blood originating from an immune mule was injected into a horse-foal (constituting the "first generation"); from this foal another was inoculated, and from that again another, and so on till the eighth generation was arrived at.

In a third series, blood originating from an immune donkey was similarly used for inoculating a number of horse and donkey foals up to the sixth generation.

The results of these experiments are summarized, and Theiler draws the following conclusions [21] :—

(1) "The inoculation of animals with horse-foal blood of the first, second, and third generations caused a mortality of six out of 186, or 3 per cent.

(2) "The inoculation of animals with horse-foal blood of the fourth, fifth, sixth, seventh, and eighth generations caused a mortality of one in twenty-two, or 4·5 per cent.

(3) "The inoculation of animals with donkey-foal blood of second to sixth generations caused no mortality amongst 173 animals.

(4) "The reactions caused by injection of horse-foal blood were more severe than those given by injection of donkey-foal blood.

(5) "No cases of relapses after discharge have occurred, proving that the immunity given by injection of donkey-foal blood is as good as that afforded by horse-foal blood.

(6) "For further immunization purposes, therefore, I recommend the passing of blood originating from a natural infection of a donkey with *P. equi* through donkey foals, and to use 1 c.c. blood from the fourth generation and upwards, bearing in mind the precautionary measures mentioned above. The precautionary measures referred to are the following:—' (*a*) Animals imported from oversea should not be inoculated until all danger of an infection with ship-pneumonia has been removed; (*b*) mares heavy in foal should not be inoculated; (*c*) animals in poor condition should not be inoculated; (*d*) the contingency must always be expected that Argentine horses and mules may die of rupture of the spleen, as they are very wild, and stabling often causes them to contract serious injuries."

(7) "Finally, all foals kept for tapping purposes, and used in connection with the inoculation, must be kept free from ticks. This precaution has been carried out at this laboratory with all foals used in the experiments, as it stands to reason that a reinfection by means of ticks would increase the virulence of the blood which is to be used as vaccine."

It will be very interesting to hear if the recommendations suggested in paragraph six have been carried out for practical purposes and on any extensive scale in South Africa, and, if so, to observe what has been the result of the method.

REFERENCES.

[1] M'FADYEAN, SIR JOHN. Post-graduate lectures, 1908, and Law's "Veterinary Medicine," vol. iv.
[2] *Ibid.* Post-graduate lectures, 1908.
[3] *Jour. of Comp. Path. and Ther.*, vol. xv., p. 46.
[4] *Ibid.*, vol. xx., p. 25.
[5] *Ibid.*, vol. xv., p. 50, *et seq.*
[6] *Ibid.*, vol. xvi., p. 312.
[7] *Ibid.*, vol. xviii., p. 35.
[8] *Ibid.*, vol. xviii., p. 109.
[9] *Ibid.*, vol., xix., p. 340.
[10] *Ibid.*, vol. xx., p. 31, *et seq.*
[11] *Veterinary Record*, January 2, 1909.
[12] *Jour. of Comp. Path. and Ther.*, vol. xvi., part ii.
[13] MANSON, SIR PATRICK. "Tropical Diseases." Revised (4th) edition, pp. 85, 86.
[14] *Jour. of Comp. Path. and Ther.*, vol. xviii., p. 231.
[15] LAW, PROFESSOR JAMES. "Veterinary Medicine," vol. iv.
[16] *Jour. of Comp. Path. and Ther.*, vol. xxi., part 2.
[17] MANSON, SIR PATRICK. "Tropical Diseases." 4th edition, p. 124.
[18] *Ibid.*, pp. 121, 244.
[19] *Ilid.*, pp., 120, 122.
[20] *Jour. of Comp. Path. and Ther.*, vol. xviii., part iii.
[21] *Ibid.*, vol. xxi., p. 148.
[22] *Ibid.*, vol. xviii., p. 232.

INFECTION EXPERIMENTS ON DOGS WITH TUBERCLE BACILLI OF BOVINE AND HUMAN TYPE.

BY C. TITZE, D.V.M. AND O. WEIDANZ, M.D.

THE authors conducted experiments to see how far dogs were susceptible to infection from bacilli of human and bovine type. Big, powerful mongrels were chosen for the experiments. It was endeavoured to infect the animals by subcutaneous and intravenous injection as well as by feeding and inhalation. The following conclusions were arrived at:—

(1) Dogs show considerable resisting power to infection with tubercle bacilli, whatever mode of infection and whichever type of bacillus is chosen.

(2) This resisting power is not the result of a considerable natural immunity which dogs might easily by their mode of living acquire. They frequently take up tubercle bacilli in small quantities, and these may be seen even in young dogs. The resistance is due to a primary attribute of the system of the dog.

(3) With large quantities of both the bacilli of human and bovine type it is possible to infect dogs in all the different ways. Both types were about equal in their pathogenic powers.

(4) The tuberculous changes with a great number of bacilli of bovine and human type were mostly small, showed no tendency to advance, but healed in the great majority of cases.

(5) Very seldom does a generalized advanced tuberculosis occur, *i.e.*, one that kills. In these cases, however, there are frequent changes which have a great similarity to the cavernous lung phthisis of men.

(Separate impression from "the works on tuberculosis of the Government health officer, Goedecke.)

(*Deutsche Tierärztliche Wochenschrift.*)

Clinical Articles.

CALCULI OF THE BLADDER—CYSTOTOMY AND RECOVERY.

BY FRED. HOBDAY, F.R.C.V.S., KENSINGTON, W.

THE patient, a Yorkshire terrier, female, aged 5, was brought in consultation by a brother practitioner, with a history that for some six or seven months she had been observed by the owner to have an irritable condition of the urinary tract, sitting down and micturating frequently when taken out to exercise. Small quantities of urine were passed at a time, on some occasions this amounting only to a few drops, and sometimes there was continuous straining.

As she had been delivered with difficulty of a large puppy about a year ago and had been very ill afterwards, it was at first thought that she might have had the pelvic organs injured, and that this was a sequel. Examination *per rectum*, however, demonstrated beyond any doubt the presence of calculi in the bladder. Medicinal treatment was tried for a short time, but, as no improvement occurred, an operation was decided upon.

A grain of morphia was administered hypodermically, and half an hour later the patient was placed on the operating table. The site of operation selected over the distended bladder was carefully shaved and disinfected, an incision being made over the median line just in front of the pelvic border. The bladder was withdrawn, and allowed to rest on a piece of sterilized mackintosh sheeting and carefully packed around with sterilized wool. An incision was then made in the median line on a part which was free from blood-vessels, and one by one some thirty-two calculi (varying in size from a millet seed to a filbert nut, and weighing $1\frac{1}{2}$ oz.) were extracted. The interior of the bladder was carefully swabbed with chinosol solution, and the wound completely closed with a double row of silk sutures inserted in Lembert's pattern. The bladder wall was very much thickened especially the internal coat. The muscle of the abdominal wall was closed with interrupted silk sutures and the external skin with silkworm gut, a coating of iodoform-colloid hermetically sealing the external surface. The morphia had acted splendidly throughout the whole operation, and at no time could the little animal be said to have suffered pain.

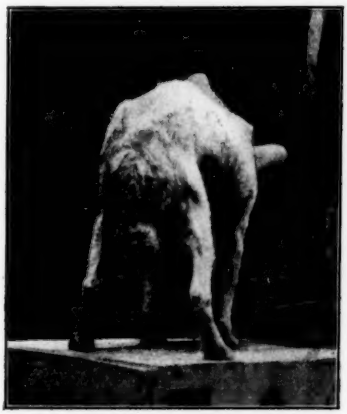
The operation was performed on July 6, and as the wound had apparently healed by first intention, the silkworm-gut sutures were removed on the 13th. During the interval there had been no constitutional disturbance whatever, the only anxiety reported by the nurse who had her in charge being that there was great difficulty in keeping the little animal quiet. In fact, on the 14th, after an irrepressible bout of barking and jumping about, the skin wound opened a little and one of the muscular (silk) sutures, which was exposed, was removed. Otherwise progress was quite uneventful, and the owner took the dog away from hospital on the 19th.

A CASE OF ORCHITIS IN A DOG.

BY A. HEINEMANN, KENSINGTON, LONDON.

THE subject, a wire-haired fox-terrier, was aged 11, and until he was about 10 years old had been in excellent health. During the last year his teeth have been rather bad, some being carious, and others being coated with tartar. His breath became very fœtid, and his bowels irregular, with a tendency to constipation. He lost condition, becoming dull and more or less emaciated, and his skin showed eczematous eruptions. About four months one testicle was noticed to be a little enlarged, and after a while it increased in size very rapidly.

In this condition the dog was brought to me, and I had him photographed. One testicle was enormously enlarged, and the spermatic cord suspending it was thick and felt œdematous. The other testicle



Orchitis in a dog.

was extremely small, and was apparently atrophied. I advised castration, and the owner agreed to have the operation performed. Morphia was administered hypodermically, and the operation performed under strict antiseptic precautions. The sutures were removed on the fourth day, and the wound healed by first intention, the dog being returned home on the eleventh day after the operation was performed.

The additional treatment adopted included scaling of the teeth and extracting some, while the diet consisted of raw lean mutton and milk soured by lactic acid bacilli (Metchnikoff) in tablets. The skin was dressed daily with—

℞ Zinci oxid. ... ... ℥ss.
Liq. carbonis deterg. ... ... ℥i.
Aquæ destill. ... ... ad. ℥viii.
Ft. lotio

The dog improved very quickly, and seems now to have taken a new lease of life.

The testicle was forwarded for examination to Professor Wooldridge, who had sections cut and examined, and reported that the enlargement was due to orchitis of a severe type, with numerous hæmorrhages. These occurred both in the testicular substance and also under the tunica. Those in the latter situation formed movable fibrinous blood-clots.

HÆMATOMA OF THE SUBMAXILLARY REGION OF A BULLOCK.

BY A. D. MACGREGOR, KIBWORTH, LEICESTER.

History, &c.—Four months ago this two-year-old bullock had a swelling about 3 inches above the angle of the jaw on the right side. He went off his food somewhat, and, according to the attendant, the swelling burst in about a week, when the bullock began to pick up again in condition. Nearly a month ago I saw the bullock and a swelling, evidently similar to the first, was rising in the same site. This swelling very gradually became larger, but as it did not seem inclined to burst, and thinking it was an abscess, a cantharides blister was applied. The next day the animal was in a very pronounced state of dyspnœa and was also slobbering. He had his jaws very tightly closed and he did not eat nor drink for seven days. Then the swelling burst but no pus was present. I did not see it burst, but from the appearance of the opening I should think it had bled a little. He then began to drink a little and his breathing was less laboured. I syringed the cavity out once and he died two days after, *i.e.*, three days after the bursting.

Post mortem.—The neck was opened and we found a tumour on the right side under the hyoid bone. It was encapsulated, except on the inner side. Its position was therefore just below (or in front of) the articulation of the jaw. The lungs were emphysematous. The animal had evidently died of weakness and gradual asphyxiation.

The tumour, weighing over a pound and a half, was sent to Professor Wooldridge, of the Royal Veterinary College, London, who pronounced it to be a hæmatoma. It consisted of firm layers of fibrin round the outside and more recent-looking clots in the middle, separated by firm layers of fibrin similar to those in the peripheral portion.

SLEROSTOMUM TETRACANTHUM.

BY "COUNTRY PRACTITIONER."

THE serious losses caused by this worm amongst young horses commonly, and older ones occasionally, are well known. The three cases about to be recorded all occurred in animals belonging to the same farmer, and strangely enough these animals were all out of the same mare. The three-year-old and two-year-old were males and had not been castrated; the yearling was a filly. The owner was grazing too many horses on his pastures which were rather bare. However, in addition to the grass they could gather a daily supply of hay was given.

When the red worms were first observed in their fæces, the colts

were not in the best of condition, but still were not very poor. Three or four weeks after the worms were first seen, the animals had lost flesh, were weak and their appetites capricious. Intermittent diarrhœa had made its appearance and dropsical swellings soon appeared in the intermaxillary space, on the brisket and sheath, and the legs became very much filled. These swellings so frequently occur in this affection that the condition is in some districts known as "water farcy."

The colts were brought into a yard with a shed, fed well, and dosed with various vermicides, including turpentine, iron, assafœtida, thymol, antimony tartrate, creosote, and lysol.

The yearling gradually improved in condition and eventually recovered. The two-year-old and three-year-old soon became so weak that they could not rise unaided from the recumbent position. When standing, if caused to move about they threatened to fall. Their condition now appeared hopeless, but the owner requested that further treatment should be adopted. We were therefore compelled to sling the colts. As there appeared to be great danger of the slings causing sores they were kept close against the animals' bodies only for a few hours at a time.

The two-year-old next became affected with troublesome paraphimosis (which is apparently not an uncommon complication), but this was eventually reduced. Next the lungs became œdematous, and the colt died.

The three-year-old lasted a week longer, and though thin and worn out—a mere cage of bones—he would try to kick his attendant until the very last. We made a *post-mortem* examination of the three-year-old. A good deal of clear fluid was present in the peritoneal cavity. The wall of the large intestine was much thickened and infiltrated with watery fluid. The intestinal contents amounted only to a little slimy material in the small gut, and some hay and grass in the large intestine. The mucous membrane of the large intestine was peppered with small black or greyish black particles which were no doubt the encysted embryos of *Sclerostomum tetracanthum*. A rather remarkable feature of the *post mortem* was the absence of sclerostomes in the bowel lumen, although within a few days of death large numbers had been passed in the fæces. The only worms found were four *Tænia perfoliata*, and these were inhabiting the small intestine, although their more common habitat is said to be the large intestine. Probably the excessive scouring removed all the free red worms, but the tæniæ had managed to remain in the small intestine, and were apparently none the worse for the long exposure to vermicides to which they had, in common with the red worms, been subjected.

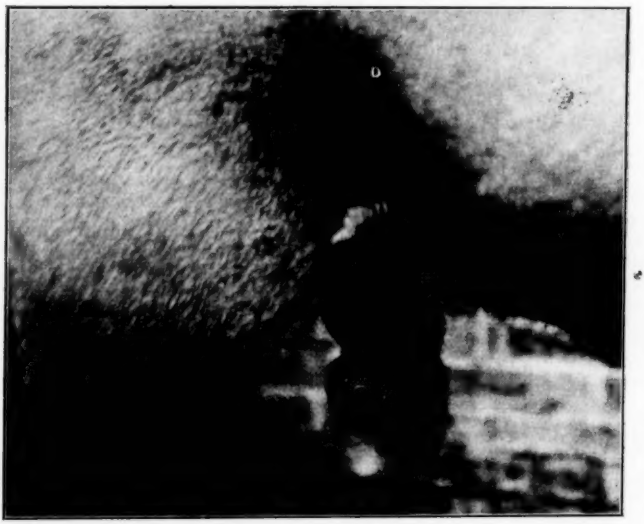
TWO CASES OF PAPILLOMA OF THE PENIS IN HORSES.

BY GEO. H. WOOLDRIDGE, F.R.C.V.S., M.R.I.A., PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

CASE I.—Early in March of this year, a blue roan gelding was brought into the College clinique with a large tumour hanging from his prepuce. The tumour was evidently causing great irritation, for the horse was straining and groaning frequently, but he was

unable to pass more than a few drops of urine at a time. The growth was of the "cauliflower" type and was exuding a very offensive discharge. Examination *per rectum* showed the bladder to be practically empty.

On the owner consenting to have the horse operated upon, the latter was cast on his off side with hobbles and chloroformed. The near hind leg was then released from the hobble and drawn as far forward as possible by means of a single side-line. The growth was washed and examined and found to be affecting the glans penis and free end of the urethra, and sending dense strands into the body of the penis for about 3 in. After thorough disinfection, a catheter was inserted into the urethra; a tight bandage was applied, commencing at



Papilloma of the penis of a horse.

the free extremity to render the organ as free from blood as possible, a tape ligature tied on at the top, and the bandage then removed. The operation was then proceeded with by what I believe is sometimes called Pritchard's method. The penis was cut through by a circular incision down to the urethra, and about an inch of uretha left projecting beyond the cut surface of the corpus cavernosum, which was lightly seared by a dull red-hot iron. A V-shaped slit was then made longitudinally along the lower margin of the urethra by means of the hot iron, extending to the cut accelerator urinæ muscle. The tape ligature was then removed, the catheter withdrawn, and the horse allowed to rise. The cold water hose pipe was then played on to the prepuce for awhile, and there was very little hæmorrhage.

For about six weeks the patient did extremely well. He ex-

tended the stump of the penis when micturating and it could be seen to be healing. At the end of that time the horse was again brought in showing abdominal pain, and with the history that he had been unable to pass his water for twenty hours. Rectal examination revealed a very distended bladder and a stricture was feared. Efforts to draw the penis while standing were unavailable, so the animal was cast and then the free end of the organ was examined. The urethral orifice was only slightly constricted, but the chief cause of the trouble was a plugging for about an inch with a yellow fibrinous lymph-like substance. This was removed by means of a grooved director. The horse was then allowed to rise and he immediately micturated, flushing out the urethra freely. Since then I have had no further complaints and presume he has had no recurrence of his trouble.

The tumour was examined by Sir J. M'Fadyean who pronounced it to be a true papilloma.

Case 2.—In this case the growth, of the cauliflower variety, was limited to the glans penis and did not involve the urethra. There was no discharge from it. Excision was therefore simple, hæmostasis again being practised by means of the actual cautery.

The main interest in this case lies in the microscopic examination, which showed all the true characters of a papilloma with the addition of a few nest-cells. Sir John M'Fadyean expressed the view that there was no reason for regarding it as other than a non-malignant papilloma.

A CASE OF CHRONIC PIROPLASMOSIS IN THE HORSE.

A horse, aged 4½, in a bad state with œdematous legs, was sent to the clinique of the Veterinary School of Milan. The animal had manifested some vague trouble three months previously. For a month he had had diarrhœa; rectal temperature 38·9° C. The œdema spread to the sheath and the sternal region. Heart sounds feeble and deadened. The blood was fluid and the red globules sparse 2,450,000). Blood preparations coloured by Romanowsky's and Giemsa's methods showed endoglobular parasites under varied aspects.

Intravenous injections of quinine do not produce any improvement. The horse died, and at the autopsy there was hypertrophy of the liver and spleen with thickening of the connective splenic tissue, cirrhosis of the liver and pigmentary degeneration of the hepatic cells. Inoculation in the jugular of a healthy horse of 450 centigrammes of blood from the sick subject gave no result. The author questions whether hepatic cirrhosis has any direct relation with the piroplasmosis, and thinks not, as sclerosis of the liver is not rare in horses dying of diverse illnesses.

Abstract.

A TRYPANOSOME FROM ZANZIBAR.

BY COLONEL SIR DAVID BRUCE, C.B., M.B., F.R.S., D.SC., LL.D., AND CAPTAIN A. E. HAMERTON, D.S.O., AND H. R. BATEMAN, ROYAL ARMY MEDICAL CORPS.

ABOUT the middle of April, 1908, Dr. J. Rose Bradford, F.R.S., had handed over to him by Dr. Edington, F.R.S.E., a rabbit whose blood contained a trypanosome. Dr. Edington stated that he had inoculated the rabbit with blood from a horse he found at Zanzibar suffering from some obscure disease. This rabbit was handed over to one of us (D.B.) by Dr. Bradford for the purpose of keeping the strain alive and, if possible, identifying the species of trypanosoma.

The following notes have since been received from Dr. Edington. The trypanosome was found at Zanzibar, where no trypanosome has formerly been known. It occurred in a horse in a stable among others, of which none were infected. The animal was old, and had been many years in the place. At death the symptoms were like those in surra and nagana, but the spleen was not enlarged, nor was it coloured abnormally. The usual œdema was apparent and most marked in the sheath, up the abdomen, in the chest, and down the posterior limbs.

Dr. Edington inoculated a horse, an ox, and a goat successfully. The disease ran a subacute form in the original horse, but in the inoculated one it seemed rather more acute. Inoculated on February 18, trypanosomes were seen in its blood on the 25th, and by March 1 the sheath was swollen. There was no real fever (102·2° F.) until February 28, so that in this case the appearance of parasites preceded the fever. On March 7 it had greatly recovered, œdema had subsided, and the weakness of the preceding few days was recovered from. Dr. Edington left on March 8, and fears the animal was destroyed, as they had no further vote for funds for food, &c.

A young ox, inoculated on February 15, showed trypanosomes on the 27th. It had fever fairly high, but had recovered before he left, and trypanosomes were exceedingly few. A goat showed high fever, but its blood never showed trypanosomes at any time, although Dr. Edington hunted with very great thoroughness.

Two rabbits were inoculated, one subcutaneously and one intraperitoneally. The former was sent to Dr. Mesnil from Marseilles, but it has shown nothing. It was twice inoculated with big doses, one from a horse and one from an ox. The other Dr. Edington handed over to Dr. Bradford, and from this rabbit the trypanosome under consideration was obtained and studied.

On examining the rabbit's blood the trypanosome was found to be a small one, with poorly developed undulating membrane, and no free flagellum. The average length was only 13·5 microns.

Although it is impossible in some cases to name the trypanosomes from their shape and size alone, still it is evident that a trypanosome of this size, with no free flagellum, cannot be *Trypanosoma brucei, evansi, gambiense*, or several other species which need not be enumerated. The names of such small trypanosomes as *T. nanum* (Laveran),

T. congolense (Broden), or *T. dimorphon* (Dutton and Todd), at once occur to the mind.

No doubt the tendency in naming these hæmatozoa is to multiply unnecessarily the number of species. But, on the other hand, it is just as great a mistake to lump too many species together, as has been done. If there is some well-marked difference in two trypanosomes, even if alike in shape, such as their power of setting up disease in certain animals, their mode of spreading from the sick to the healthy—it may be in one by tsetse flies, in another by stomoxys or tabanus, or by other means—then, naturally, it is of great practical use to distinguish them by different specific names.

Again, it might be argued that if two trypanosomes were different morphologically, but had the same effect on animals, the same distributor and the same carrier, then the two varieties for practical purposes might be included in the same species.

For example, when we have to do with *T. gambiense* we at once know that man is susceptible, that the carrier is *Glossina palpalis*, and that we must keep ourselves out of the area of distribution of this fly if we would escape infection. Theories in regard to the spread of sleeping sickness by mosquitoes, stomoxys, fleas, sexual intercourse, and such like, may, for practical purposes, be ignored. If it is *T. brucei*, then we know man is not susceptible, but that we must keep our horses, cattle, and dogs out of the area of distribution of *G. morsitans*.

The three most important questions to be borne in mind, in classifying trypanosomes, are, what animals are they capable of infecting, the gravity of the infection, and, thirdly, what is the carrier? To these may be added the morphology of the trypanosome, its cultural characteristics, if any, and, if possible, cross-inoculation experiments. If these several facts could be set down for each trypansome encountered in Africa, then some classification of the African species might be attempted. But it is only for a few species, such as *T. gambiense* and *T. brucei* that we have all these data. Take, for example, the case of *T. congolense* (Broden) and *T. dimorphon* (Dutton and Todd)—most important trypanosome diseases. Laveran thinks they are distinct on account of a cross-inoculation experiment, but Broden himself, Rodhain, and Dutton and Todd all seem to lean to their really being one and the same species. With the data at our disposal at present it is impossible to come to a definite decision.

At the present time the classification of the pathogenic trypanosomes is in a state of chaos, and we have no desire to add to the confusion. Nevertheless, we think it will be well to give a description of Dr. Edington's trypanosome, as far as we have been able to study it, in view of the fact that we are starting at once for Uganda to continue the investigation of sleeping sickness.

Morphology of Dr. Edington's Trypanosome.

(*A*) *Living, Unstained.*

Dr. Edington's trypansome in the fresh condition, as seen in a drop of blood from an infected guinea-pig or rat, appears short and stumpy in outline, about twice the diameter of the red blood corpuscles, among which it slowly moves, with, as a rule, its rapidly

vibrating flagellum in front. The posterior or non-flagellar extremity appears blunt and rounded off abruptly, while the anterior tapers off to a fine point. In the fresh preparation the undulating membrane is not much in evidence, though sometimes it can be seen thrown into waves. The contents of the cell are homogeneous, except for a small refractile body at the posterior extremity, which is evidently the micro-nucleus.

(*B*) *Fixed and Stained.*

Method of Staining.—The method used for fixing and staining the trypanosomes is usually as follows. The blood-film while still moist is exposed to the vapour of a 4 per cent. solution of osmic acid in distilled water, to which a drop of glacial acetic acid has been added, for forty-five seconds. The cover-glass is then transferred to absolute alcohol for from five minutes to half an hour. It is then passed through grades of alcohol from 80 per cent. to 10 per cent. in distilled water. Twenty-five drops of Giemsa's stock stain (Grübler's) are now mixed with 25 cc. of distilled water. The films are placed in this, face downwards, for eight to twelve hours, then washed in distilled water, and rinsed quickly in solution of orange tannin (orange G. 1 per cent., tannin 5 per cent., in distilled water). When sufficiently decolorised, the films are washed in distilled water, dehydrated by passing through acetone, cleared in xylol, and mounted in Canada balsam.

Dr. Edington's trypansome, when stained in this way, appears of a pale puce colour with reddish-purple nucleus and micro-nucleus. The following detailed description must be understood to refer to this trypansome as found in the blood of the white rat.

Length.—It is no easy matter to measure these small irregularly shaped bodies, and doubtless the method of measurement used will govern to some extent the result. The method used by us is simply to draw a sharp outline of the trypansome by means of a Zeiss camera lucida, at a magnification of 2,000 diameters, and then to measure along the middle line of the body by means of a pair of fine compasses, the points of which are separated 2 mm. Each step the compass takes is therefore equal to 1 micron. Twenty trypanosomes, taken as they come, are measured in this way in each specimen, and an average of the twenty measurements taken. The longest one observed was 20 microns, the shortest was 8 microns, while the average length was 13·6 microns.

Breadth.—On an average the breadth at the widest part is 3 microns.

Shape.—Dr. Edington's trypanosome when stained is seen to be of a short and stumpy shape, somewhat reminding one of a miniature electric eel. The posterior extremity is, as a rule, blunt, or rounded or obtuse-angled, but sometimes, though rarely, it is prolonged into a sharp beak-like process. The anterior end tapers more or less, and ends in a short, stout flagellum. The undulating membrane is narrow but distinct. The flagellum arises at or near the micro-nucleus and passes along the edge of the undulating membrane. There is no free flagellum, the protoplasm of the cell and the undulating membrane extending as far as the tip of the flagellum.

Contents of Cell.—The protoplasm, which is stained a pale puce colour, is homogeneous in structure.

Nucleus.—The nucleus is oval in shape, about 2·5 microns in length, and is situated at the centre of the trypanosome.

Micro-nucleus.—The micro-nucleus, centrosome, or kineto-nucleus is small, round, or rod-shaped, and is situated close to the posterior extremity. It stains more deeply than the nucleus.

Undulating Membrane.—The undulating membrane is narrow. As a rule, it is straight and simple, and does not show much tendency to be thrown into folds.

Flagellum.—The flagellum stains intensely. It is well marked, and does not project beyond the protoplasm of the cell and the undulating membrane. Sometimes, in faintly-stained specimens, there is the appearance of a slight projection of the flagellum beyond the body; but, speaking broadly, this species of trypanosome may be said to have no free flagellum.

The conclusion to be drawn from a study of the morphology of Dr. Edington's trypanosome, *T. dimorphon* and *T. congolense*, is, that the two first resemble each other very closely, whereas *T. congolense* seems to be of a somewhat shorter and stouter form. It will also be seen that in the strain of *T. dimorphon* used there is only one form, and that the short or tadpole form described by Dutton and Todd. With regard to this, it may be of interest to quote some remarks of Dr. Breinl, to whom I am obliged for his courtesy in sending me this strain. He writes: "With regard to *T. dimorphon*, you are aware that some remarkable change has occurred in the strain between the time Drs. Dutton and Todd brought it back from Africa and we started work on it here. Whereas Drs. Dutton and Todd describe the long flagellated forms with the free flagella, Thomas and myself, Laveran and Mesnil, could not see these forms with a thin body and a long flagellum. The strain I send you in a rat is the original strain."

It is difficult to understand how this change in morphology has been brought about. It may be that Dutton and Todd were dealing with a double infection, of which one has died out. This point will require to be investigated on the spot.

Another matter for consideration is whether this name *T. dimorphon* should be adhered to. It certainly seems a misnomer when applied to the strain figured above. If it should be decided to drop it, I think the compliment should be paid to Dr. Todd of naming it after him.

Inoculation Experiments on various Species of Animals.—The animals in which the effect of the inoculation of Dr. Edington's trypanosome has been studied have been horses, cattle, goats, monkeys, dogs, rabbits, guinea-pigs, white rats, and mice. The inoculations were made, as a rule, intraperitoneally. Inoculation experiments with *T. dimorphon* were also made for purposes of comparison.

The details of the experiment can be consulted in the original, but our purpose will be served by quoting the conclusion, viz.: "The results of these inoculation experiments with Dr. Edington's trypanosome and *T. dimorphon* show that they act on the various animals employed in a strikingly similar manner."

Conclusion.—Details of cultural characters are also given, and this most instructive contribution winds up as follows: "The conclusion arrived at is that Dr. Edington's trypanosome from Zanzibar is probably Dutton and Todd's *T. dimorphon*. One link of the chain of evidence, however, is wanting, and that an important one—the identity or non-identity of the carrier.

(*Abstract from the Proceedings of the Royal Society.*)

Personal.

Mr. S. Locke, M.R.C.V.S., of Manchester, has been elected President of the Royal College of Veterinary Surgeons for the year 1909-10.

Professor Macqueen has been elected President of the National Veterinary Association for the year 1909-10.

It has been arranged that the Annual Meeting of the National Veterinary Association for 1910 shall be held in London.

The very admirable veterinary diagrams introduced for teaching purposes by Mr. Henry C. Wilkie, F.R.C.V.S., were awarded a silver medal at the Franco-British Exhibition. Those who have seen and used them will readily agree that the honour is well deserved. It is proposed to exhibit them, probably with additions, at Brussels next year.

Reviews.

Pure Milk and the Public Health. A Manual of Milk and Dairy Inspection. By Archibald Robinson Ward, B.S.A., D.V.M., Assistant Professor of Bacteriology and Director of the State Hygienic Laboratory, University of California, Berkeley, California. With two chapters by Myer Edward Jaffa, M.S., Professor of Nutrition and Director of the State Food and Drug Laboratory, University of California. Pp. 218 + xiii., with 17 illustrations. Published by Messrs. Taylor and Carpenter, Ithaca. Price $2.00 net, post paid.

So much has during the last few years been written on the milk supply and its bearing on public health, that were it not for its vital importance one would long since have tired of it. However, when we realize this importance, and that the subject presents so many aspects which must be considered, we are compelled to welcome each fresh endeavour to help forward the movement which has for its object the solution of the pure milk problem.

The work under consideration represents such an endeavour, and may be regarded as a palatable condensation of modern thought in relation to this matter, together with numerous instructive observations of the author.

More than twenty years ago Lister said that "unboiled milk as coming from a healthy cow really contains no material capable of giving rise to any fermentative change, or to the development of any kind of organism which we have means of discovering." Present day opinions differ on this point; Swithinbank and Newman in their "Bacteriology of Milk," agree with Lister's assertion, but Guillebeau, Zschokke and Leblanc claim to have found organisms in the sinus and canal apparently doing no harm, just in the same way that they are in the mouth and pharynx. Dr. Ward throws in his lot with the latter,

and in addition to finding micro-organisms in the apparently healthy teat canal and sinus, he quotes authorities who hold that they have found bacteria distributed right through the substance of healthy udders.

The various means by which milk may become contaminated are well considered. When the grooming of cows prior to milking is practised, the necessity for carrying out this process at least half an hour before milking in order to give the dust time to settle is indicated.

An interesting observation is made in connection with the centrifugalization of milk, viz., that "passing milk through a centrifugal machine may increase the apparent number of bacteria by separating the clumps."

Dr. Ward's views on the chemical preservation of milk are put into a nutshell when he says, "chemical preservatives are substitutes for cleanliness and refrigeration, besides being undesirable constituents of an article of food."

The milk-borne diseases receive concise consideration. Modern views on tuberculosis are well condensed, and attention is called to the fact that "the disease is a tremendous source of loss to the live stock industry, and worse yet, the majority of those men suffering the loss have not awakened to the idea of the possibility of prevention." Dairymen and others must be made to realize that this is the case before we shall obtain their help in dealing with the milk question. Interesting figures are given in connection with gastro-intestinal affections resulting from the consumption of contaminated milk in Paris; the diarrhœal death-rate in breast-fed infants varies from a minimum of 2 per thousand in winter to a maximum of but 20 per 1,000 during the hot months. The diarrhœal deaths of the artificially fed fluctuate from a minimum of 12 per thousand in winter to a maximum of 158 per thousand in summer.

Chapters are devoted to inspection, pasteurization, analysis, and adulteration of milk. We think no one will fail to gain useful information from this little book, which contains just now over 200 pp. of print and seventeen illustrations, and which is excellently produced.

THE PRINCIPLES AND PRACTICE OF VETERINARY MEDICINE. By William Williams, revised by W. Owen Williams and F. S. H. Baldrey. Demy 8vo. Pp. 986 + xviii.; 85 plates and 88 illustrations in the text. Published by Messrs. Baillière, Tindall and Cox, London. Price 25s. net.

We have always had profound respect for the works of which the late Professor W. Williams was author. He was a keen and careful observer, and had a homely way of expressing himself which lent a charm to his books. His "Principles and Practice of Veterinary Medicine" reached its eighth edition twelve years ago. Since then many changes have taken place in the field of veterinary medicine, and much of the matter in that edition has become out of date.

Realizing this fact, Professor Owen Williams (assisted by Major Baldrey, and numerous others, among whom are several members of the staff of the Liverpool University), has revised the work and the ninth edition which has just been placed in our hands represents an

endeavour to bring the various subjects in line with present day knowledge. Several conditions now receive more detailed descriptions.

Among the subjects which claim increased attention—or are described in this book for the first time—are the following: The opsonic theories, theories of infection and immunity, contagious abortion, variola equina, epizootic lymphangitis, swine erysipelas, South African horse sickness, coccidiosis, tuberculosis in the horse, preparation of tuberculin, spirochætosis, tetanus, the Pasteurelloses trypanosomiasis, piroplasmosis and actinomycosis. Many portions which conformed no longer with current views have been cut out, and many corrections have been made in the matter allowed to remain.

The poisonous plants and their effects are more fully treated. Menières disease is included among the cephalic affections and parasitic diseases receive more attention. The whole work has been increased by more than 120 pages, and several new illustrations have been inserted. Although numerous improvements have been made, not all the alterations and additions are likely to escape unfavourable criticism. In connection with rabies we find the following: "In a case of suspected rabies in a dog the animal should not be killed immediately, but should be kept under observation for three or four weeks and then killed." We believe most authorities are of the opinion that a dog is not rabid if, after showing the first suspicious symptoms, it lives seven or nine days.

Then in connection with M'Fadyean's purple reaction in staining anthrax bacilli with methylene blue the following appears: "When using this stain in anthrax blood-smears the stain splits up, the bacilli stain blue, and the *fluid* around them pink. . . ." According to M'Fadyean the purple reaction depends on the peculiar staining affinities of the capsules, which, when the films are stained by watery stains swell and break away from the bacilli.

Anthrax in poultry is described without mention of the fact that birds must have their body temperatures reduced before they become very susceptible to anthrax. Under the Pasteurelloses gloss-anthrax, equine influenza and Stuttgart dog disease are placed. We think many people will be disinclined to admit that these conditions are caused by organisms of the fowl cholera type.

The time has arrived when such terms as diphtheria and scarlatina should cease to be applied by veterinarians to diseases of animals which have not the same cause as, and which are not related to, diseases so designated in human medicine. Scarlatina in horses, we are told, is not contagious. Four forms are said to be recognized in man. Two only of these are mentioned as occurring in the horse, and of these the malignant form is identical with purpura, but it is stated that there is a possibility of any of these forms degenerating into purpura. Surely the term scarlatina as applied to disease in horses would be better left alone. One disease cannot actually be transformed into another, and the assertion that "scarlatina" can degenerate into purpura is absurd. The work is produced in Messrs. Baillière's usual good style.—M. J.

Miscellaneous.

NINTH INTERNATIONAL VETERINARY CONGRESS AT THE HAGUE.

SEPTEMBER 13 to 19, 1909.

THE preparation of the Congress is in full swing, and more than 800 participants from all parts of the world have had themselves inscribed as members, whilst many official delegates have been appointed.

Out of more than 140 persons who promised to give reports about the subjects previously mentioned, over 100 have proved true to their word. A few of the other contributors have obtained, for well-founded reasons, prolongation of the term of sending in their papers. The others are regarded as having foregone their wish of reporting upon some subject, now that the term of sending in their papers has expired.

The Committee has already begun to despatch the printed papers to those who have had themselves inscribed as members, so that the members have already received a number of them.

The Committee will endeavour to have the reports that came too late printed before the date of the Congress. It will, however, be impossible to have the summaries translated likewise in all those cases.

The meetings of the Congress, as well as the opening and closing sessions, will be held at Scheveningen, in the rooms of the Kurhaus and of the hotels of the "Exploitatie-Maatschappij Scheveningen." These rooms are already appointed for the purpose.

The Executive Committee has likewise arranged a plan for the festivities and ceremonies connected with the Congress. The gala banquet will take place on Thursday, September 16, in the great concert hall of the Kurhaus. On Friday, September 17, a gala performance will be given in the Royal Theatre at The Hague. Further particulars will be communicated in the official programme which will be published in a short time.

As concerns the excursions, in the afternoon of Wednesday, September 15, the celebrated harbours of Rotterdam will be visited, and after the expiration of the Congress, consequently after September 18, the great excursions will begin. In the first place a visit will be paid to the town of Utrecht and its beautiful environs.

On Monday, September 20, the inauguration of the monument in honour of the late Dr. Thomassen, who died in 1906, will take place at the Veterinary School of the State in Utrecht. Thereupon the excursionists will go to the Northern provinces of the Netherlands, where the most remarkable towns and districts will be visited, and in some places cattle and horse-shows will be organized for the members of the Congress. For those who wish to see another part of Holland, excursions to the province of Zeeland are planned. A preliminary programme of the excursions will soon be sent to the members.

A committee of ladies has been formed, whilst a plan for occupying the ladies of the members in a pleasant manner during the sessions of the Congress has been prepared.

All particulars concerning the Congress will be communicated in a detailed circular, which will be sent in due time to all the members, and which will likewise contain detailed descriptions of the towns and districts that are to be visited by the excursionists.

Moreover, the members will receive a copy of the statutes of the Congress, and a guide to The Hague and Scheveningen, offered to the members by the Executive Committee.

Persons interested are requested to apply :—

(*a*) For information to the General Secretary, Professor Dr. D. A. de Jong, 20, Maresingel, Leyden ; to the Second Secretaries, Dr. H. Remmelts, 6, Tournooiveld, The Hague, and Dr. H. Markus, Wilhelminapark 22, Utrecht, or to the Director of the Secretary's Office, Mr. Z. Th. de Jongh van Arkel, 6 Tournooiveld, The Hague.

(*b*) For membership to the General Treasurer, Mr. D. F. van Esveld, 14 Plompetorengracht, Utrecht, adding f. 10.— = 21 Frcs. = 17 Mark = 17 Sh.

(*c*) For lodging, to Mr. Z. Th. de Jongh van Arkel, 6 Tournooiveld, The Hague.

(*d*) For the excursions, to the tourist's office: Lissone en Zoon, 155 Singel, Amsterdam.

In the name of the Executive Committee,

D. A. DE JONG,
General Secretary.
Maresingel 20, Leyden (Holland).

Leyden, July 1, 1909.

ROYAL COLLEGE OF VETERINARY SURGEONS.

EXAMINATIONS IN LONDON.

AT a meeting of the Board of Examiners held in London on July 9 for the written, and on and between July 13 and 17 inclusive for the oral and practical examinations, the following gentlemen passed their final examination :—

Mr. J. M. Armfield
,, T. F. Addison
,, A. W. Brasnett
,, E. J. Barrowcliffe
,, G. F. Banham
,, J. T. C. Bradshaw
,, J. R. Conchie
,, M. Cahill
,, P. D. Carey
,, W. E. Footner
,, A. E. Froggatt
,, J. N. Glass
,, H. W. Good
,, H. S. Head
,, G. N. A. Hall

Mr. G. L. Y. Ingram
,, F. Marks
,, B. H. Mellon *
,, E. McK. Nicholl
,, E. P. Offord
,, A. F. O'Dea
,, H. R. Singleton
,, R. H. Smythe
,, J. H. Spreull
,, J. H. V. Treseder
,, L. Thompson
,, F. A. LePoer Trench
,, G. Wacher
,, H. S. Woods
,, T. D. Young

The following passed their third examination :—

Mr. R. M. Aulton
,, D'Arcy S. Beck
,, J. McK. Brown
,, D. A. E. Cabot
,, F. L. Eady
,, J. T. Faithfull-Davies
,, G. Fox
,, B. Gorton †
,, J. C. Gaunt
,, W. D. Jordan
Mr. L. H. Leach *
,, R. Moore
,, B. A. Myhill
,, D. Meadows *
,, W. K. Stephens
,, H. D. Sparrow
,, S. Smith
,, T. L. Vaisey
,, T. W. W. Wright

The following passed their second examination :—

Mr. R. B. Cockburn
,, T. J. Davis
,, J. T. Edwards
,, G. V. Golding
,, H. E. Hornby
,, F. F. Horton
,, W. H. Kirk
Mr. R. E. Leach
,, F. C. Minett
,, W. A. Pool
,, E. B. Reynolds †
,, G. V. Steevenson
,, H. Stephenson

The following passed their first examination :—

Mr. O. S. Broadhurst *
,, A. L. M. Bebb
,, K. J. S. Dowland †
,, E. S. Farbrother
,, J. Going *
,, S. J. Gilbert †
,, W. P. Hamlyn †
,, A. C. Holl *
,, P. Howard
,, S. E. Hill
,, J. M. Knighton
Mr. R. A. Murless
,, S. W. Marriott *
,, W. F. Morton *
,, A. A. Pryer *
,, E. M. Robinson
,, K. H. Soutar *
,, J. M. Smith
,, P. L. Thierry *
,, G. M. Vincent *
,, P. R. Viljoen †
,, U. W. F. Walker

Examinations in Liverpool.

At a meeting of the Board of Examiners held in Liverpool on July 9 for the written, and on and between July 15 and 19 inclusive for the oral and practical examinations, the following gentlemen passed their final examination :—

Mr. J. A. Griffiths
,, R. P. Jones
Mr. R. J. Little
,, W. S. Walker

The following passed their third examination :—

Mr. J. R. Barker
,, G. T. S. Mower
,, H. Beckett
,, H. Dykins
,, C. W. Makinson †
Mr. T. G. Millington
,, H. Quiggin
,, W. Taylor
,, W. R. O. Williams

The following passed their second examination :—

Mr. T. Craig
,, C. Holland †
,, G. G. Howard
Mr. W. P. Stokes *
,, A. D. Bunton
,, S. K. Jones

The following passed their first examination :—

Mr. V. A. Bartrum
,, R. Isherwood *
,, R. H. Knowles †
,, A. D. Morgan
Mr. J. W. Procter *
,, R. Rimmer *
,, H. Sumner *

EXAMINATIONS IN DUBLIN.

The following gentlemen passed their final examination :—

Mr. M. Darby
,, J. E. Fitzgerald
,, J. C. McKittrick
,, E. Mulligan
,, S. H. Power
,, S. H. Ewing
Mr. A. F. Good
,, D. Kehoe
,, W. St. J. M'Cartney
,, A. V. Meeke
,, Andrew Snodgrass

The following passed their third examination :—

Mr. R. Higgins *
,, J. M. Mathews
,, P. McDonnell *
,, F. Shearman
,, J. S. McCann
,, T. B. Hayes
,, Thos. Hunt
,, A. Kirkpatrick
Mr. H. C. Lowry
,, W. Nyham *
,, J. F. O'Grady *
,, J. F. Sheedy
,, Jas. White
,, C. Macara-Finnie
,, J. Crowe

The following passed their second examination :—

Mr. M. J. Brett
,, E. W. Little
,, A. S. Mathias
,, W. E. Phipps
,, H. W. Carbury *
Mr. P. F. Dolan
,, J. J. G. Keppel
,, P. O'Connell
,, N. D. Vakil

The following passed their first examination :—

Mr. B. Clancy
,, J. J. Cosgrove †
,, P. J. Gaughan
,, C. E. Huston *
,, H. Irwin
Mr. T. McD. Kelly *
,, T. O'Leary
,, Thos. Quirke *
,, Jno. Quinlan †
,, P. J. Sheil

† Passed with First Class Honours.

* Passed with Second Class Honours.

Translations and Extracts.

THE DIAGNOSIS OF ANTHRAX.

BY VETERINARY SURGEON KLUGE, IN REICHENBACH.

In four recent cases of anthrax in cows I have met with unusual symptoms. I had the opportunity of seeing the animals alive, though only a few minutes before death. In none of the animals was the temperature up to 40° to 42° C., as given in the text-books. The temperature shortly before death was rather remarkable.

With no hæmorrhages also from the natural openings it was not always easy for the veterinary surgeon to prevail on the owner not to send for the butcher.

Case 1.—At 11 o'clock at night I was sent for to a cow, which was dying. The cow was lying on her left side; there were strong contractions of the muscles of the neck, and drawing up and straining behind; at times twitching of the whole muscular system. No discharges from the natural openings, no tympanites, temperature 31·6° C. In spite of anthrax being suspected, slaughter was forbidden by the owner. During a rather stormy word scene with the owner the cow died, about ten minutes later.

A short time after removal of the carcase from the stall it was tympanitic. Next day anthrax was officially confirmed.

Case 2.—At 6 o'clock one morning I was called to a prostrate cow belonging to a farmer. The cow was lying on the left side, groaning peculiarly; no bloody discharges nor tympanites; temperature 38° C. The right leg bent at all joints. The head pulled to the right quickly turns back to the left. The hind extremities quivering and contracting. Here also the owner would not permit slaughter for suspected anthrax. The cow died within five minutes.

After removing the carcase quickly from the stall the rectum protruded and bled; in the neighbourhood of the vagina, rectum and udder there were bluish-red discolorations. On the next day the carcase was greatly swollen and little hæmorrhage present. The before-mentioned bluish-red skin spots on the udder had become necrotic. Anthrax was officially declared.

Case 3.—At 6 o'clock in the evening I was telephoned for to attend a cow which had suddenly fallen ill, belonging to a tanner. When I arrived the cow stood pressing her head to the right side and boring her horns into the crib; from the right nasal orifice there was a dirty yellow discharge, with some foam. Breathing sonorous and forced; no movements in the rumen, which felt firm; appetite gone. Temperature 39·7° C.

After removing the next cow she doubled up and collapsed on her left side. Her extremities were normal and she remained quiet and raised her head. Some hay and straw were taken up and held in her mouth and she kept quivering and shaking her head. Her look was staring. On touching the cornea the cow shrank back. She took notice of the cowman's voice but could not get up. The shaking of the head continued and it was pressed to the left. Because the cow appeared to be quieter slaughter was cautiously advised.

After three-quarters of an hour a telephonic message came that the

cow was very restless and had been stuck, and quickly became tympanitic. I forbade further cutting of the carcase. Next day anthrax was officially diagnosed.

Case 4.—Five days later the owner telephoned that the next cow to the preceding one, which had been removed, had suddenly fallen ill. She had been very restless, thrown herself about, bored on the wall and fallen back convulsively. I telephonically forbade slaughter. On my arrival the cow was lying quietly on her left side, with head bent to the right. Breathing forced and snorting. From the left nasal opening foam and a little reddish fluid escaped. The hair was upstanding; some dung pressed out of the rectum was not mixed with blood.

Before I could take her temperature the cow died. Anthrax was declared in her case. In four further cases in which the animals exhibited similar symptoms and had been stuck I forbade the butchers to do anything further with the carcases; anthrax was also declared in these cases. One of these cases merits special notice. A heifer, aged 8 months, was suddenly taken ill and immediately slaughtered by the butcher. The meat inspector declared the flesh diseased and announced his suspicion of anthrax. The spleen was considerably enlarged and swollen; spleen pulp dark and semi-liquid. Hæmorrhages in the intestine and yellow jelly-like masses. After I had inspected further I declared anthrax.

In an examination of the spleen and blood preparations only isolated bacilli were found. In pulling out the kidneys the neighbourhood showed yellowish coloured serum and a flat-formed clot as big as a plate, and between kidney capsule and kidney there was a small mass of clotted blood; anthrax bacilli were found in both these materials.

(*Deutsche Tierärztliche Wochenschrift.*)

CONTRIBUTIONS TO THE STUDY OF LOWER JAW AND TEMPERO-MAXILLARY ARTICULATION AFFECTIONS OF THE DOG.

BY PROFESSOR KEGENBOGEN, OF BERLIN.

Fractures of the lower jaw are not unfrequent in the dog. Paralysis of this jaw may have no connection with rabies (twenty-one cases in 76,600 dogs examined in eight years).

Many authors attribute paralysis of the lower jaw in the dog to a rheumatic influence. Hutyra seems to believe in bruising of the motor branch of the trigemini by energetic contractions during violent efforts of mastication. Prehension of food being impossible, soups into which the invalid can sink his head up to the commissure of the lips are administered. Injections of strychnine and electric shocks are useful. Cure results in 78 per cent. of cases.

Tempero-maxillary arthritis has been established twice in 76,600 dogs. The first case was in a hound, aged 6, whose masseters were very atrophied. The opening of the mouth was limited to 3 cm. and the temporo-maxillary articulations were tumefied and painful. The animal was nourished with liquid food.

The second case concerned a terrier, aged 6, affected with chronic suppurative arthritis of the right temporo-maxillary articulation with a fistula from which bad-smelling pus escaped. Exploration of the fistula showed at its depths a piece of necrosed bone the size of a pea detached from the condyle. The necrosed parts were excised and the wound irrigated with sublimate solution 1 in 1,000; the place was bandaged and two days after the wound tamponized with iodoform gauze. In seven days cure was complete.

(*Revue Générale de Médecine Vétérinaire.*)

PLEUROTOMY IN A MARE AFFECTED WITH PURULENT PLEURISY.

BY M FLORIOT, ASSISTANT VETERINARY SURGEON TO THE 5TH DRAGOONS.

"In the infirmary," says Cadiot and Almy, "one practises pleurotomy for empyema. Unless pleural symphises exist this operation can only be performed for unilateral pleurisies; bilateral pleurotomy involves collapse of the lungs and death." And these classic authors cite the cure of a case of penetrating wound of the pectoral cavity reported by Mauri.

Analogous cures are quite frequent in the army and several volumes of the *Recueil d'hygiène et de médecine vétérinaire militaires* contain one or two following on wounds by the lance or sabre.

Army veterinary surgeon Blin in 1895 practised the first pleurotomy in a case of double pleurisy, sero-bloody on the right and purulent on the left. He obtained a cure. We do not believe that a like success could be renewed, but the following experiment made by the chief of the clinique of the Cavalry School deserves recording.

A thorough-bred mare, Dame de Cœur, aged 4, was affected with pleuro-pneumonia following strangles on February 22, 1908. Thoracentesis practised on the right on the 29th gave issue to 6 litres (about 1¼ gallons) of yellowish liquid. This thoracentesis was renewed on the right on March 1 and 4. On the 8th thoracentesis always on the same side gave exit to 8 litres (about 1¾ gallons) of creamy pus, and on the 11th to 6 fresh litres of pus, whilst on the left 8 litres of yellow serosity was obtained.

On March 12, the chief of the clinique practised pleurotomy and lavage of the pleura on the right.

Operation.—In the seventh intercostal space, a little above the subcutaneous vein, close to the anterior edge of the rib, an incision 3 centimetres long was made in the thoracic wall. After lavage of the pleura with boiled water a caoutchouc drainage tube was left in the cavity and fixed at the orifice by a skin suture. Body bandaged. Six days after the opening was enlarged to 10 cm. With a curette of a good length made out of iron wire a kilogramme of grumous pus was got out of the cavity with the help of forced detergent injections. A gauze plug replaced the caoutchouc and the pleura emptied and washed seemed to fill every day.

In spite of the greatest attention Dame de Cœur died on April 12. Her right pleural cavity was only a vast abscess communicating

externally with the thoracic incision. Other large abscesses were found in the lungs, mediastinum and lymphatic glands. The patient who, thanks to surgical intervention, retained her appetite to the last, could not be cured. The operation certainly prolonged life for some weeks.

(*Revue Générale de Médecine Vétérinaire.*)

TREATMENT OF PANARITIUM (FOUL IN THE FOOT) IN CATTLE.

BY VETERINARY SURGEON K. NIELSEN, SOERING.

NIELSEN removes all scurfy stuff with a drawing knife from the clefts between the claws, but avoids bleeding. Then he cleanses the space and neighbourhood with warm soda solution, and carefully dries the cleaned surface. Then he dips a piece of wadding in pure carbolic acid, and energetically touches the affected parts several times. He is careful to penetrate all crevices and cracks with it. He put a tampon soaked in lysol or carbolic acid in the cleft, and bandages it in.

On the day after treatment the cow usually stands better, and four to five days later lameness is as a rule gone. If this has not happened then the dead tissue between the claws must be removed, and a second application made. Also in this second operation one must carefully avoid causing bleeding.

(*Maanedsskrift for Dyrlaeger.*)

WIREWORM IN SHEEP: AN ARSENICAL REMEDY.

H. C. v. R. writes, giving the following as a commendable remedy against "wireworm in sheep": Take 2 oz. of washing soda, 1 oz. of arsenic, well dissolved in warm water, and 2 spans of good "loogtabak" (lye tobacco). Put this in 4 gallons of boiling water, leaving it there for fifteen minutes. As soon as it is well settled and cooled, it may be administered. Dose for full-grown sheep: as much as two small Dutch medicine bottles can contain; for young sheep, a smaller dose. Wherever this remedy has been administered in has proved to be a genuine remedy. Before administering, strain it through a cloth. Loogtabak is the usual Oudtshoorn roll tobacco, which is moistened with some lye mixture for sweating purposes, hence its name, "loogtabak." Any South African farmer knows what it is. The contents of a Dutch medicine bottle is two-thirds of an ounce of liquid.

Mr. R. W. Dixon, M.R.C.V.S., of the Veterinary Branch, offers the following comments on the above: Cooper's Dip Powder, which is a compound of arsenic, is extensively used in this Colony in the treatment of tapeworm affecting kids and lambs, the dose being one teaspoonful for ten young sheep. A teaspoonful of Cooper's Dip weighs about 135 grains, which, according to analysis, contains 29 grains of white arsenic, therefore the dose is practically 3 grains of arsenic for each sheep, a full-grown sheep may get 4 grains with safety. The

contents of the Dutch medicine bottle is computed to be about two-thirds of a fluid ounce, therefore the full dose of arsenic contained in two Dutch medicine bottles is under 1 grain of arsenic, for each fluid ounce of the solution prescribed above contains only 0·68 grain of arsenic. Our experiments with solutions of arsenic given much stronger than that recommended by Mr. van Rooy for the treatment of wireworm have not given such satisfactory results as blue-stone solution. Possibly the tobacco assists to destroy or expel the wireworm.

(*Agricultural Journal of the Cape of Good Hope.*)

VERY SIMPLE REACTION ENABLING RAW MILK TO BE DISTINGUISHED FROM COOKED MILK.

BY GAUCHER.

GAUCHER uses a solution of hæmatin 1 per cent. Twenty drops are put into 20 cc. of raw milk, and as many into 20 cc. of boiled milk. The boiled milk is decolourized in a few seconds, the raw fluid remains rose-coloured. The colouration of the raw milk lasts twenty-four hours and even longer; it is not destroyed by microbian development. The decolouration of cooked milk only manifests itself after some minutes if the temperature has not gone beyond 70° C.; from 80° C. decolouration is almost immediate. Decolouration is only obtained if the milk has been boiled in the open vessel; with milk heated to 100° or 110° C. in closed pans colouration persists. Gaucher recommends employment of freshly prepared colouring solutions.—G. M.

(*Revue Générale de Médecine Vétérinaire.*)

New Instruments.

EYE SHADE.

BY CAPTAIN H. J. RYAN, A.V.C., FERMOY, CO. CORK.

FOR some years I have been trying different methods for shading horses' eyes, as in my hands I found that a piece of dark cloth tied on to brow-band did more harm than good in a great number of cases. I will ask your readers' forgiveness if I expatiate at length on facts which to some are apparent; but, owing to the use of the old-fashioned eye shade being so common, I think I am justified in going into details as regards the faults I found with it.

In the first place, if the eyelid is inflamed, the presence of a cloth in contact with it is not advisable, more especially if it be of a rough, coarse, "blankety" texture, and this is the kind of material which in an emergency is often used. Secondly, one has only to remain quite still for a short time in a stable—be it a loose-box or stall—in which there is a horse with a cloth over his eyes, particularly if the eye or eyes be injured, to be assured that the old-fashioned way of doing things is not correct. On doing this, I found the following to be invariably the case. After the affected eye or eyes have been dressed, and the cloth adjusted, the animal when being turned round—unless

the action has been very carefully accomplished—either rubs or strikes the eye against some object, be it the side of stall, pillars or wall, for the simple reason that he cannot see where he is going. With the common iron mangers used in England, if the horse is put on the log-chain in the ordinary way, he invariably hits his eye against the manger when raising his head after picking up bits of hay, &c., which have fallen to the ground. If the eye pains or is itchy, he will rub it against the manger, which does not improve matters. Thirdly, a damp or dry cloth, as the case may be, deprives the tactile hairs or feelers which grow on the upper eyelid of their function. When these feelers are damaged, as they often are, it is impossible for them to grow normally if the common custom of putting on a wet cloth is adopted, for this keeps them bent down in an abnormal position for perhaps days or weeks together, and sometimes, as a result, they either break off or fall out. Now some may say that these few hairs are not worthy of consideration, but one has only to observe a number of horses, and it will be found that these hairs vary greatly in length, &c. I cannot help but think that the length of these tactile hairs in different horses depends on whether the animal has got normal, long, or short sight, and that with all horses they act as feelers in the dark. I noticed them to be greatly increased in number, and some of them to be 8 in. long in a horse which was blind of both eyes, yet this animal was able to roam about any stable or loose-box without inflicting an injury on himself.

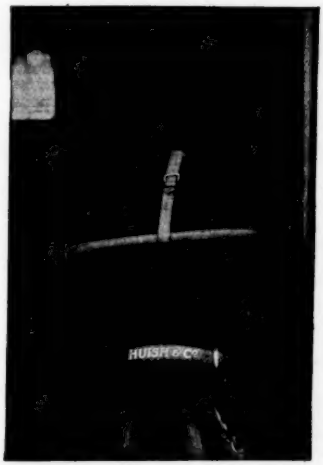
I found that with a great number of cases it was impossible to effect a cure of an injured eye till these hairs assumed their normal length and position. I have seen horses during daytime, whilst turning round in an ordinary 6-ft. stall with boarded sides, rub their eyelids against side of stall when deprived of these hairs; but later on, when these hairs had grown and assumed their normal length and position, no matter how quickly or carelessly the animal turned round, the eyelids did not come in contact with the boards.

I do not wish to go into the pathology of "specific ophthalmia," but personally I am convinced that whilst under treatment the sudden and unexpected recurrence of the disease is in a great number of cases due to, or aggravated by, an external injury which perhaps leaves no mark whatever; but if the stable has been recently whitewashed, a little of the white from wall may be found on lid, proving that it has come into contact with the wall, and as a result very often the eye will be found to be in a much worse condition.

Being convinced that it was not advisable to tie a cloth over the eyes, and in order to overcome the difficulties connected with it, I tried placing the horse in a dark stable, but after a few days the atmosphere became so stuffy and foul-smelling from the evaporated ammonia, &c., that the animal's health was affected and the eye became worse; consequently I had to discontinue it.

I next tried various forms of shades on the blinker principle, also a round leather box which fitted either eye, but each of these had its drawback, and it was only about twelve months ago that I hit upon the one of which I now enclose an illustration. It is the simplest, cheapest, and certainly the most practical of any I have tried, and if at first I could have thought of this pattern, it would have saved me much time, trouble, and expense.

Description.—The framework is made of a piece of light iron, which is so constructed that it projects over both eyes, and carries a loop at either end through which the pole-strap of head collar passes. Over this a cloth (preferably dark green or billiard cloth) is attached, which is fixed above on to brow-band, and below is fastened round the nose by means of an elastic band. This latter arrangement does not interfere with the animal's feeding. Over the iron bar on outside is sewn a band of leather which prevents the cloth being rubbed or worn in case of contact with the wall. There is a buckle in the centre of the brow-band, by means of which it may be adjusted to fit either a horse or a pony, and, if necessary, the opening in the iron frame can be increased or decreased, as the case requires, by means of pressure at either end.



With this contrivance both eyes are enclosed in a dark chamber into which no ray of light can pass, nor can any portion of this shade come in contact with animal's eyes.

There are some who will probably object to this shade, owing to the fact that it covers both eyes, whilst only one is under treatment; but here let me remind them that there are few members of our profession who have not at some time come across cases where, through what is commonly termed "sympathy," a non-affected eye has become affected in consequence of a disease existing in the other eye. For an affected eye it is necessary to obtain all possible rest; therefore I maintain that, owing to their conjugate movements, this is impossible unless both eyes be completely shaded.

This shade has far more advantages and none of the disadvantages of the old-fashioned method previously alluded to, and by its adoption it will be found that the number of cataracts resulting from injury to the eyes will be considerably reduced.

When put on an animal, he invariably walks backwards and feels